Volume 58 Part 3

QUEENSLAND AGRICULTURAL JOURNAL

Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

MARCH, 1944

Issued by Direction of
THE HONOURABLE T. L. WILLIAMS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER, BRISBANE

Contents

	PAGE.
Event and Comment—	
Australia a Main Food Base ..	131
Advances to Farmers and Graziers	132
Field Crops—	
Winter and Spring Fodder Crops	133
Cotton Culture—	
The Value of Early Ploughing for the Cotton Crop	148
Fruit Culture—	
Packing Houses and their Equipment	151
Vegetable Production—	
Vegetable Seed Contracts ..	178
Applied Botany—	
Gomphrena Weed	179
Answers to Correspondents—	
Johnson Grass	179
Plant Protection—	
Ladybird Beetles	181
Seed Inoculation of Lucerne and Other Legumes	185
Sheep and Wool—	
Fat Lamb and the Food Problem	186
Gadgets and Wrinkles—	
Pulling Out Trees	190
Land Levelling for Erosion Control	190
The Farm Home—	
Example and the Children ..	191
The Makings of a Square Meal ..	192

ANNUAL RATES OF SUBSCRIPTION.—Queensland Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.

QUEENSLAND AGRICULTURAL JOURNAL

Volume 58 | 1 MARCH, 1944 | Part 3

Event and Comment.

Australia a Main Food Base.

COMFORTING comparisons with pre-war figures of food production are not enough. The only figures of production worth considering now are the figures which relate to present needs. The need for a bigger output of basic foodstuffs is definitely here.

The developments of the past year have brought this question of adequate food supply to the attention of every authority, and also to those who hitherto have thought of war primarily in terms of fighting forces and their equipment. It is now realised that defence plans must be co-ordinated with agricultural plans. The nation must have food to win the war and have a lot left over to ensure a lasting peace. The very success of our forces in the field increases the demand on the agricultural and pastoral resources of Australia. That demand will be greater yet, if we are to fulfil all our food commitments in regard not only to our Allies and Britain, but to those people of the war-devastated countries who look to us, as well as to other primary producing countries which are still free, to satisfy an ever-gnawing hunger.

The war also has brought out in bold relief the fact that agriculture as an industry is a consumer of goods as well as a producer of food, and that farmers must have these goods in the form of essential equipment and supplies, if they are to produce the food now needed so urgently.

If there is any need which will commend itself to the Australian farmer, it is the need of the people of Britain, and as far as he able he will make sure that Australia's contribution of foodstuffs to the Old Country will be worth while and that no ship shall leave Australia's shores with an empty hold. During the past five years Britain has produced immense quantities of war material of every kind and, at

enormous cost and risk, conveyed it in British vessels convoyed by British warships over the most perilous ocean routes of the world for use in *all* the theatres of war. The men and women making these munitions must be fed, and it is questionable whether they could physically continue their output on less than their present meagre ration. A definite obligation is on the other countries of the British Commonwealth to ensure to Britain a continuous supply of essential foods outside the range of her own extraordinary war production effort. Therefore, the co-operation of all concerned is necessary for the success of the 1944 food production campaign. The rural labour position is being eased, and other farming requirements are being made available so that Australia may continue as one of the food bases of the United Nations.

Advances to Farmers and Graziers.

NEW agricultural legislation, *The Co-ordination of Rural Advances and Agricultural Bank Act*, passed recently by the State Parliament is a measure of much importance to Queensland primary producers. The most important provisions probably are those for an increase in the maximum advance from £1,800 to £5,000; increased advances for the purchase of stock and plant; special advances for irrigation purposes, crop production and fodder conservation; and an extension of the maximum repayment term from 25 years to 35 years, inclusive of an interest-only period up to five years.

When introducing the measure the Premier and Treasurer, the Hon. F. A. Cooper, M.L.A., said that although it would come into operation immediately, it was also part and parcel of the Queensland Government's post-war planning to stimulate greater rural development and to help generally in the wealth production of the State. Interest on all advances made would be at the reduced rates of *four per centum per annum*. Special advances for effecting improvements on more or less undeveloped blocks may be made to the full value of the improvements, to a maximum amount of £1,250. Moreover, special advances, not necessarily secured by first mortgage, may be made for the purchase of stock and equipment. The maximum in each case is as follows:—

> Sheep £1,000, beef cattle £1,000, dairy cattle £400, farm horses £100, pigs £100, agricultural machinery and plant (including machinery and plant for fodder conservation) £500, separator and other dairying plant £250, pineapple and banana suckers and/or other seeds and plants for approved purposes £150, grass and fodder crop seed £50.

The new Act also provides for loans up to £500 for crop production and for fodder conservation. The value of irrigation is recognised by a clause authorising assistance up to £750 for the purchase of pumping equipment, pipe lines, and other necessities. The maximum unspecified purposes advance has been increased from £400 to £1,000. The total amount that may be advanced to any one person or on any one farming proposition may not exceed £5,000, inclusive of special advances.

Further information regarding the assistance now available from the Bank for all rural development purposes, release of existing mortgages, or payment of the balance of purchase money may be obtained through either local centres or the General Manager, Box 123B, G.P.O., Brisbane; or on enquiry at the Bank's Brisbane Office, corner of Grey and Melbourne streets, South Brisbane.

Winter and Spring Fodder Crops.

R. E. SOUTTER, Senior Research Officer, L. M. HODGE, Acting Senior Instructor in Cotton Culture, and W. H. BECHTEL, Instructor in Agriculture.

WHEREVER climatic and soil conditions are suitable, the growing of fodder crops during the autumn, winter, and spring months should have an important place in the cropping programme of farmers and the smaller stock owners throughout Queensland. Each year witnesses a decline in milk production in most dairying districts which reaches its peak during one or other of the periods mentioned; there is also a loss of condition in livestock generally throughout most of the State where the animals are either grazed solely on the native pastures or receive only dried forage as a supplementary ration. The one district in which these conditions are not pronounced is the far northern coastal area, where the growth of certain introduced grasses appears to be sufficiently good to enable beef cattle to hold their condition reasonably well throughout the year.

This reduction in the production of milk and its by-products, and the loss of condition in livestock is of the utmost importance in the marketing of animal products, and it affects the incomes of the producers far more than is realised. A beast that has lost condition in winter cannot obtain the full benefit, from the point of view of production, from the highly nutritious first green flush of pasture in the spring. Hence, in the case of the dairy farmer, not only is there a decline in milk production during the period when the cow loses condition, but there is also the loss of the potential production that a cow is capable of yielding when she has been kept in good condition. The situation may be even more serious with the pastoralist, for a beast requires several months to replace lost condition and get back to the rate of increase of weight that the early summer pastures are capable of producing. It is obvious, therefore, that farmers and pastoralists should adopt every practicable measure to reduce the loss of condition in their livestock that normally occurs during the winter and early spring months in most parts of the State.

An examination of the rainfall data for different districts indicates that, except in purely coastal areas, the production of winter-growing grasses and legumes is likely to be satisfactory only in abnormal seasons. The rainfall in the late summer, autumn, and early winter months in more inland districts, while irregular in occurrence and intensity, generally totals enough, however, to allow of the satisfactory production of winter-growing fodders, provided the summer rainfall has been conserved in an early, well-prepared seed bed. It is believed, there-

fore, that all farmers and small stock owners should grow autumn-sown fodder crops for winter and spring grazing. Experiments and the general results obtained on farms in many districts, have shown that a number of varieties of several very suitable crops are available for such a purpose. By having a series of periodic sowings of judiciously selected varieties of these crops on properly prepared seed beds, farmers and stock owners in all sections of the State receiving an annual rainfall of over 22 inches, excepting possibly the inland sections of the northern monsoonal belt, could undoubtedly provide additional profitable winter and early spring grazing for their stock in most years. As the summer rainfall is nearly always ample in these districts to provide a satisfactory growth of summer fodder crops, provision could be made for ample storage of either silage or dry fodders to supplement the growth of winter fodder, and thus normally bring the livestock into summer in good condition.

The incomes of dairymen and the smaller stock owners therefore can be considerably augmented by sowing winter and spring-growing fodder crops for grazing by their stock. The suggestions appearing in this article regarding the growth of such crops in the different districts of the State are discussed under the headings of those applicable to South Queensland, to Central Queensland, and to North Queensland.

A.—IN SOUTH QUEENSLAND.

A careful analysis of the rainfall records extending over half a centry serves to show that, generally speaking, the precipitation in South Queensland is somewhat erratic, varying appreciably from one season to another and in the individual seasons as well. The bulk of the rain, even in the best-favoured areas, falls during the summer months, and in nearly all sections of this district during the autumn-winter-spring period, extending from April to the end of September, the conditions frequently tend to be rather dry except that autumn planting rains generally are experienced. Under such conditions, it is very evident that those engaged in the livestock industry, more particularly in dairying and fattening lambs, will have to supplement the feed produced in the natural pastures in order to be wholly successful. This cannot be done entirely by establishing permanent pastures of introduced winter grasses or clovers, and the most successful and profitable course to pursue is to grow temporary winter crops, such as wheat, oats, and barley, for grazing during the winter and spring periods when supplies of feed in the natural pastures are generally unattractive and often depleted. The satisfactory production of these crops over a series of years can be achieved, however, only by a careful and early preparation of land of a suitable nature in the same manner practically as that recommended for the production of a winter cereal grain crop, and the seasonal sowing of the varieties most suited for the locality and purpose intended.

Oats.

The oat is the cereal most extensively used in Queensland for winter grazing, and the variety most generally sown in the southern part of the State is the Algerian. In 1937 there were 135,639 acres of oats sown throughout the State, three-quarters of which consisted of the Algerian variety. Of this area, 123,743 acres were used for grazing purposes only, 4,187 acres were cut for hay, with an estimated average yield of 1·15 tons per acre, and the balance was permitted to mature grain.

Oats have wonderful recuperative properties, and if sown early in the autumn in South Queensland they can be fed down three and even four times in a season, providing favourable conditions are experienced, such as early germination, a sufficiency of moisture, and the occurrence of mild weather late in the winter.

Though oaten hay can be, and is, successfully made in Queensland, the varieties at present in general cultivation are all more or less susceptible to rust, the presence of which, even to a small extent, greatly reduces its value as feed. Consequently, until varieties, more suitable in this and other essential respects, are evolved and are available to the grower, it is doubtful if oaten hay production will show any expansion in South Queensland.

The oat is really a cold-climate crop, and for successful grain production it requires a cooler climate and more rainfall than is generally experienced in the winter in this State. It may be, however, that varieties will be evolved eventually which will incorporate the necessary resistance to rust and diseases generally, with other essential characteristics, that will also allow them to be grown successfully for grain production. There was a period in the wheatgrowing industry in this State when the varieties being grown were no more, if as well, adapted to Queensland conditions than the oats at present sown. As a result of cross-breeding and selection over a number of years, varieties of wheat are now available that possess to a greater or less extent the essentials which allow them to be grown successfully for grain production. Perhaps agricultural history may repeat itself and suitable grain-producing varieties of oats may be evolved for use in this State. At present, however, the oat crop in Queensland is sown primarily for grazing purposes, the acreage devoted to haymaking and grain production constituting only a small proportion of the total.

Other conditions being favourable, oats can be profitably grown on a greater diversity of soil types than either wheat or barley. It is necessary, however, that the soil be in good tilth to produce the best results with oats, and to obtain this condition, frequent and early working is essential, more particularly on the heavier soils.

The sowing period is in no small measure controlled by the condition of the seed-bed, the weather, and the variety selected. For green-feed purposes, it can be said to extend from February up to the middle of June, according to locality. The earlier sowings made up to the end of April are restricted to the slower-growing varieties, such as Algerian and Guyra, whereas the quick-growing ones, represented by Mulga, Belar, and Sunrise, are generally selected for later planting, more particularly in the warmer and drier districts. Some growers make early sowings of the quick-growing varieties with a view to affording their stock a "bite" while the slower-growing ones are reaching a stage suitable for grazing.

The rate of sowing is controlled more or less by the method employed—i.e., drilling or broadcasting, time of sowing, variety, and locality, but, generally speaking, from 40 to 50 lb., if drilled, and 60 lb., when broadcast, will give satisfactory results in the south.

Sowing by means of the drill or combine is the best method to employ, for not only does it save up to one-third of the seed required for broadcasting, but the seed is placed in the soil at an even depth,

safe from the attacks of birds, and, if there is a sufficiency of moisture in the seed-bed, a quick, uniform germination is obtained, with a resultant even growth of crop. When, however, there is no alternative to broadcasting, the seed should be sown after satisfactory rain has fallen on a seed-bed that has been prepared by a tine cultivation which has left the soil surface slightly but evenly ridged. After sowing, a light harrow drawn across the field will cover the seed lying in the slight hollows formed by the tine cultivation.

Perhaps there is no farm crop which calls for greater care in the selection and purchase of seed for sowing than the oat. It is not only wise, but it is really essential to success, to obtain seed supplies from a reputable seed-merchant or other reliable source, so that the variety will be true to name, well threshed, graded, and free from disease, foreign seeds, and extraneous matter. Oats are of such a nature that contamination might readily pass unnoticed, being in some instances very difficult to discern, and nearly impossible in the case of an admixture of some of the varieties grown here.

As already mentioned, in Queensland the Algerian variety is the one that is most extensively sown for green-feed purposes. It is fairly drought resistant, a good stooler, and slow growing, for which reason it has to be sown early. When this is done, the plants are usually well established by the time conditions become drier, which fact in no small measure has gained for it the reputation it has for drought resistance. Though the Algerian variety is grown so extensively for green feed, it is not as palatable as many other varieties, and is susceptible to rust and smut. Sunrise is a very early-maturing variety and, as a result, stools poorly, thus necessitating heavier sowing. It stands feeding-off well and is more palatable than the Algerian. Belar and Mulga have been grown with more or less success in the drier areas of South Queensland, and, being of a quick-maturing habit like Sunrise, they are suitable for sowing late in the season.

Barley.

Barley is a hardy plant that is grown successfully from the tropics to within the Arctic Circle, and is an important crop in North America, Africa, Europe, and parts of Asia, the United States of America alone growing approximately 6,750,000 acres of it annually. It is not now used to any great extent as human food, but is largely used in stock fattening and as a ration for horses. In Australia the grain is utilised chiefly for malting purposes.

There is less demand for barley than for wheat, barley is more affected by wet weather at harvesting, it is more rapidly overgrown by weeds in a wet spring, and it does not lend itself so well to present-day harvesting methods as does wheat; for all these reasons a great expansion in the area under this crop for grain production in Queensland is unlikely in the near future. Compared with wheat and oats, it has a poor root system, for which reason it tends to pull up more readily when being grazed on certain soils and in some seasons. Nevertheless, it provides the earliest green feed of any of the winter cereals, and can be fed off repeatedly if conditions are favourable for regrowth. In wheatgrowing areas, barley should follow a hay crop if grain is to be produced for malting, as the presence of wheat detracts from its value for that purpose. Likewise, an area cropped with barley should be followed by a crop intended for hay or for grazing, as the presence of barley in wheat greatly reduces its value for gristing, and as a result the wheat secures a low classification and correspondingly poor price.

Barley is more exacting in its soil requirements than either oats or wheat, but any moderately rich soil of a friable nature will, when well worked, produce excellent returns under favourable conditions.

The sowing period in South Queensland extends from the end of March until the middle of June. Crops sown during March and April are generally intended for grazing, though in some seasons, when conditions are favourable, some growers permit their crops to mature grain after they have been eaten down once or twice. May and June sowings are usually made for grain production. The rate of sowing when the seed is drilled ranges from 45 to 60 lb. per acre, and when broadcast is about 75 lb. per acre.

Barley has been grown in the Darling Downs section of South Queensland with varying success for a number of years, the chief centre of production being Clifton. In 1937, 5,923 acres of malting barley, yielding an average of 14·28 bushels, and 2,732 acres of other barley, yielding 13·33 bushels per acre, were grown in this area. Only 626 acres of barley were cut for hay, which yielded an average of 1·25 tons, but 11,966 acres of this crop were grown in the State for grazing purposes.

As a result of observations extending over a number of years, the Cape and Skinless varieties are considered the most suitable for green feed purposes. The Cape is a hardy, heavy yielding, dual purpose variety of the six-row type that is sown extensively on the Downs for both feed and grain production. The Skinless variety is an awnless six-row barley which, on being threshed, separates readily from the husk, giving it the appearance of wheat, hence the term "skinless." It is very early and drought resistant, and is suitable for sowing for grain or feed in the drier districts.

Wheat.

Because of its palatability, high nutritive value, and suitability to the climatic conditions of the Darling Downs, the wheat plant is used extensively in dairying and lamb raising in that district to provide winter and spring grazing. An appreciable acreage of wheat is planted each season solely for grazing purposes, and it is also customary for a considerable proportion of the growers to graze, early in the winter, a section of their fields which have been sown primarily for grain production. In seasons when, owing to the continuance of mild conditions, growth is too rapid, the crop may be frosted or lodge at a later stage in its development; to prevent such an unfortunate happening it is essential for the wellbeing of the prospective grain that the crop be grazed before it is too advanced. The wheat crop is thus a valuable asset to the stock raiser.

Whether intended for grazing alone or ultimately for grain production as well, a wheat crop should not be grazed until it is about 6 inches high or until the plants are sufficiently well rooted to prevent their being pulled up when grazed; otherwise the stand may be so seriously damaged as to reduce the yield to an unprofitable level, either for grazing or for grain production. This applies more particularly to the self-mulching types of soil. Furthermore, stock should not be placed in the fields when the soil is in a wet condition.

Where the intention is to permit a crop, after being grazed, to produce grain, sufficient stock, preferably sheep, should be placed on

it to feed it down rapidly, say within a week or ten days, otherwise the rank portions will be left, a preference being shown for the regrowth. This would result in a great deal of irregularity in growth throughout the crop which, in the case of a forward one, would cause unevenness in the date of maturity, thus handicapping harvesting operations.

Care must also be taken, when the crop is intended for grain, not to permit it to become too far advanced before placing the stock on it, otherwise the developing ears, concealed within the stalks, will be eaten off or injured and the crop ruined. To determine whether the stalks are in such an advanced condition that the ears would be eaten if the crop were grazed, sufficient plants should be taken apart to ascertain their state of development. If small ears are found within the stalks it is reasonably certain that grazing will damage the crop.

Where it is desired to plant wheat for early grazing, the Cleveland and Currawa varieties can be recommended as having given outstandingly the best results of any wheats tried in South Queensland. Both of these varieties may be planted as early as the beginning of March on the Eastern Darling Downs. In an ordinary season grazing would be provided from such planting until the end of September, but if it is desired also to obtain a grain crop it is not advisable to graze the wheat after the end of July on the Darling Downs, nor after the end of June in the Maranoa. Owing to the higher temperatures in the late summer, it is not recommended that wheat be sown in the Maranoa prior to the middle of March. The general experience has been that earlier sowings make a spindly growth with much less production of green feed. The Ford, Warren, and Warput varieties are recommended for the March sowings in the Maranoa and for April to mid-May sowings on the Eastern Darling Downs. Cultural operations for a green fodder crop of wheat are similar to those recommended for a grain crop. The recommended rate of sowing is 45 lb. of seed per acre when the seed is drilled, and 60 lb. when it is broadcast.

Certain legumes may be used as winter and spring fodder crops in South Queensland and, in this connection, the reader is referred to a departmental pamphlet, wherein such legumes as field pea and vetches or tares are discussed.

B.—IN CENTRAL QUEENSLAND.

The natural pastures in Central Queensland are normally dry and deficient in nutrients from June to September. The bulk of the native grasses are summer functioning plants, which are susceptible to frost; hence after their annual seeding, which usually takes place in the late summer or autumn, the nutrient values decline sharply, and by the time the frosts have set in, the grasses are mostly of poor feeding value. The winter and early spring rainfall is usually not sufficient for the profitable production of winter growing grasses and clovers, although it is generally enough to promote satisfactory growth of sown crops planted on well prepared summer fallowed seed beds.

It is of the greatest importance, therefore, that the farmer provide other sources of feed for his stock during these months, to maintain the animals in health and productivity. This may be done by making silage; by storing grains, pumpkins, roots, &c., for winter feeding; by making haystacks of both winter and summer grown fodder crops; by spelling

grass paddocks; or by growing crops for winter and spring feeding. It is with the lastmentioned source of feed that the following notes are concerned.

Preparation of Seed-bed.

In the Central District, where soil moisture is the principal crop-limiting factor, careful attention to the details of the preparation of the sed-bed in order to conserve moisture, must be considered as being essential to success.

Heavy falls of rain in that district are followed by dry periods of varying duration in the course of which the soil dries out rapidly. Nevertheless when cultural practices aiming at soil moisture conservation are properly carried out the rainfall is sufficient to render the growing of winter and spring fodder crops practicable, and indeed easy.

For the satisfactory growth of cereals as fodder crops a well prepared firm seed bed is essential in that it enables the seedlings to make proper contact with the moist soil and thus increases the efficiency of their absorption of water and plant foods. The method of preparation of seed-beds that has been found to be satisfactory at the Biloela Research Station over a series of seasons of a highly variable nature, is described in the following paragraphs. It will be noted that such preparation involves the maintenance of a summer fallow.

Ploughing to a depth of 4 or 5 inches should be completed in July if possible; there is usually ample moisture in the surface soil during that month to ensure of a good fallow being prepared. Later, in the normal dry spring, the surface soil dries out rapidly, especially in the heavier soils which are liable to set, and fallows prepared in August may be extremely cloddy. If land ploughed in August has a fair moisture content, a good tilth, however, can be prepared by harrowing each day's ploughing at the end of the day before the clods dry out. Such a tilth will help to reduce the excessive loss of moisture that usually occurs where the land is left in a hard cloddy condition. When heavy land is ploughed in a dry condition in August it is advisable to double disc it after ploughing in order to reduce the clods to such a size that light rains will moisten them sufficiently to permit of a satisfactory tilth being prepared by harrownig.

On the more friable soils which weather down naturally, and particularly on slopes liable to erosion, the land should be left in a rough condition. This ensures better penetration of the early summer rains, and lessens the risk of soil loss. Such soils should always be ploughed and cultivated across the slope, and never up and down. In general, soils of a very friable texture which have dense clay subsoils and are situated on sloping hillsides, as are many of the brigalow scrub soils, are extremely liable to erosion; the establishment of bare fallow thereon during the wet season should therefore be avoided, if possible.

A skim ploughing may be necessary for weed control during the wet season, but it should be avoided by timely surface cultivation where practicable. When necessary, however, the skim ploughing should be as shallow as possible.

Subsequent cultivation is directed towards weed control, and in this respect the maintenance of a summer fallow is not easy. A summer fallow, however, was maintained experimentally for four years at Biloela, and it was found that a twenty-five tine springtooth type

cultivator, fitted with 6-inch duckfeet, was a very efficient implement for the purpose, creating a sufficiently rough but not cloddy surface. In most seasons it was necessary to scarify the fallow once a month from October to February to control weed growth. Harrows were of little practical use for that purpose, as they tended to ride on the high spots, and left the weeds in the hollows, even when weighted.

The maintenance of a clean fallow during the summer months necessities a prompt cultivation after every important rain storm or rain group to destroy the fresh crop of weeds. When the planting rains occur, a thorough harrowing may be all that is necessary to obtain the fine, clean seed bed required to ensure a quick, even germination.

Crop Rotations in Winter and Spring Fodder Production.

A proper system of rotation, which includes a summer fallow, is essential for the profitable production of winter and spring fodder crops in the Central District. Land ploughed in July or August, following summer cash crops such as cotton, maize, and grain sorghums, and fallowed during the summer, will be in a suitable condition for planting to winter and spring fodder crops between March and June, or even later. Land, on the other hand, which has been allowed to carry a heavy crop of summer weeds or some early spring sown fodder crop until February or thereabouts, before being broken up, will usually yield poor results. Where a winter and spring fodder crop is to follow a crop grown in the previous winter, spring and early summer, it is advisable to plough as early as possible after that crop has been removed in order to ensure a satisfactory absorption of the summer storms. The surface of all summer fallows should be left in a sufficiently rough condition to trap the beating rains so characteristic of many of the summer storms.

Suitable Crops.

Experiments in the Callide Valley, extending over a period of years, have demonstrated that wheat and oats are the most reliable, and generally most successful, crops to grow for winter and spring grazing. Barley and rye have also been grown successfully. In addition to these, however, rape, sugarbeet, swede, and other turnips have been successfully grown in favourable seasons, the first mentioned yielding particularly heavy crops. As agriculture in the Central District generally is in an early stage of development, no doubt other suitable crops will subsequently be found. For the present, however, those already enumerated have been carefully tested and are recommended. While leguminous crops such as field pea and vetches or tares will probably grow well under good farming methods in some seasons, the customary dry spring introduces a considerable element of risk with them and, at this stage, they cannot be unreservedly recommended.

Establishing the Crop.

The seed sown should be sound, free from foreign seeds such as black oats or weed pests, and either from stocks which have been properly stored and safeguarded from insect infestation by the farmer, or procured from a reputable seedsman. The variety used should be one known to be suitable to the district.

Plate 60.

Sowing an Oat Varietal Trial.—Where a farmer does not grow cereals for grain production, it is advisable to purchase a drill if it is intended to sow any reasonably large acreage of winter fodder crops. Several types of the smaller grain drills marketed are suitable for this purpose.

Plate 61.

Oat Varietal Trial.—Note the differences in growth between the varieties at such an early stage in the development of the plants. It is advisable for the farmer to try out varieties to ascertain which are best suited to his conditions.

Sowing.

Sowing should be done as soon as possible after a good rain; if carried out before rain is received, the first subsequent rainfall may be just light enough to spoil the seed, and a fresh sowing will be rendered necessary.

It is better to temporarily subdivide into several parts the area to be planted, and to sow them at fortnightly intervals, rather than to sow the whole area on one date. Farmers are also recommended to introduce variety rather than to confine themselves to one kind of crop, thus the first sowing may be wheat, the second oats, the third barley, and so on. This arrangement will ensure a longer period of green grazing on a given area than would otherwise be the case, and will provide a healthful change of feed for the stock. In addition, it enables the farmer to ascertain which crop gives him the best results under his particular conditions. The same procedure can be followed with varieties, and suggestions may be obtained from the Department of Agriculture and Stock as to suitable varieties for different soils; these can then be tested in a similar way until the most suitable for a particular farm have been determined.

It should be remembered that winter growing cereals sown, say, in March or April, take a longer time to mature than when sown later in the season; hence the earlier sowings will give the longest grazing.

Rate of Sowing.

Speaking in general terms, heavy rates of sowing should be avoided as they tend to force maturity, whereas the objective in growing winter and spring fodders is to keep the crop in a green immature state as long as possible. The type of soil, particularly in respect to its moisture retaining capacity, will influence the sowing rate. Soils that dry out readily should be sown at a lighter rate than heavier retentive clays, which are capable of maintaining a greater plant population. Here again the farmer should experiment for himself, and endeavour to find the rates best suited to his own farm.

Depth of Sowing.

In the matter of depth of sowing, nothing is to be gained ordinarily by covering seeds deeply. The shallowest depth at which sufficient moisture will be available to complete the germination of the seedling and to establish it should be the objective; this will generally be found at from 1½ to 2½ inches, the actual depth depending on the climatic conditions and on the crop sown.

Method of Sowing.

Cereals may be drilled in with a seed drill, or broadcast, either by hand, or with any of the broadcasting machines on the market. There is every agricultural advantage to be gained by sowing through a seed drill; the plants are properly spaced at an even depth in the layer of soil containing the moisture required for germination, thus ensuring uniformity of growth, whereas when the seed is broadcast, the opposite result may be obtained. If, however, a seed drill cannot be procured, the broadcasting should be done when a tine cultivation has left the surface of the field evenly ridged, so that a light harrow drawn over the seed will satisfactorily cover it in the hollows. When broadcast, a field should be sown at a heavier rate than when drilled.

Wheat.

In choosing a variety of wheat for a grazing crop, the short season or quick maturing ones may be ruled out as being unsuitable on account of the comparatively short grazing period which they afford. Otherwise, any mid-season variety which will produce good hay is probably suitable for green feed; of this type, Florence, Warren, Warchief, and Clarendon have all been grown in the Central District with very satisfactory results.

Wheat may be planted in succession from March to late June to obtain the best results. A sowing rate of 50 lb. per acre should be used when the seed is drilled, and of 60 lb. if it is broadcast.

Plate 62.

Sheep Grazing Wheat in August in the Callide Valley.—Excellent feed was available, whereas the native grasses in the adjacent pastures were lacking in food value and palatability.

The crop may be lightly grazed when the plants are 10 to 12 inches high. Regular grazing, alternated with spells for recuperation, may subsequently take place each time the plants have grown to 16 to 18 inches in height. It is advisable not to graze too closely in the earlier feedings. Wheat, but more particularly the green heads, imparts a slight taint to the milk, and should therefore not be grazed by cows within two hours prior to milking. This crop will do well on a greater range of the soils of the Central District than the other cereals that can be grown therein.

Oats.

The early maturing varieties of oats should be used in the Central District, as the later maturing ones go off badly with the onset of the dry spring. Of these early oats, Sunrise, Mulga, and Belar are suitable for March to May sowings, while Palestine and Buddah, which are very early, are more suitable for the later plantings. Good results have been obtained as late as July with Palestine when sown on long fallowed

land. Oats may be planted mainly from March to the end of June, using a sowing rate of 40 lb. per acre when they are drilled, and 50 lb. per acre when they are broadcast.

Barley.

Barley requires a well cultivated seed-bed on fertile soil, and the growing of this crop in Central Queensland is advised only where such conditions can be obtained. Most of the varieties of either wheat or oats that are suitable for that district will give better results than barley on the less fertile soils or where it has not been possible to prepare a suitable seed-bed for barley. It is a quicker maturing crop than wheat or oats, but it will give more second growth. It should be sown in March, April, and May at an average rate of 60 lb. per acre. Varieties which have proved very satisfactory are Skinless, Cape, and Chevalier: the second and third of these varieties are probably the best where heavy tonnage is required.

Rye.

Rye is perhaps the most suitable of the winter and spring growing crops for fodder production on poor soils. It will grow a good body of feed on poor, sandy soil where the other cereals would produce indifferently, and it is accordingly valuable as a winter and spring pasture. Suitable varieties are Black Winter for early winter grazing, and Emerald for later sowings. Rye should be sown at the rate of 40 lb. per acre if drilled, or at a slightly heavier rate if broadcast.

This cereal is subject to infection by the fungous disease known as ergot.* Infection takes place when the plants are in bloom, the disease subsequently manifesting itself as black, hornlike growths, replacing certain of the grains. These ergots, as they are called, are poisonous to animals.

Rape.

Rape is suitable for autumn sown pasturage as it makes very rapid growth, and is ready for grazing in ten to twelve weeks. It will stand successive grazings by cattle for longer than the cereals, being really a biennial plant, but it is more suitable for pigs and sheep. The crop may be sown also early in June in rows 2 ft. apart and cultivated, or it may be either drilled with the standard 7-inch spacing or broadcast. In soils which dry out readily it should be sown in rows, but in heavier and more retentive soils the crop does very well when either drilled or broadcast. Sowing rates vary from 4 to 8 lb. per acre according to the method of planting. Dwarf Essex rape is the variety that has so far given the best results.

If fed to dairy stock, it is well to remember that rape is liable to cause bloat. It may also taint the milk, and cows should, therefore, not be grazed on it within two hours of milking time. It is an excellent grazing crop for pigs, and is recommended for that purpose.

Sugarbeet and Mangold.

While sugarbeet and mangold are botanically identical, they have been gradually evolved by selection to serve two distinct purposes, the mangold to provide a high yield of succulent food with a maximum content of dry matter, and the sugarbeet to produce a maximum

* *Claviceps purpurea.*

amount of sugar unaccompanied by a very large root development. The roots of both plants are readily digestible and are a valuable winter feed for farm stock.

Both crops should be confined to deep, well-drained loams or light clay loams, as either poor sandy soils or shallow soils overlaying stiff clays are definitely unsuitable. In the Central District they are best sown in April or May.

The land should be ploughed to a depth of at least 7 or 8 inches, as the plants are deep rooters, and require a loose soil in which to expand. The best results will be obtained by planting on ridges spaced 2 feet 6 inches to 3 feet apart; these are made by throwing two furrows together with a single furrow plough, and then running a light roller from end to end to flatten and firm the soil.

Seed may be sown with a drill, but when small areas are to be sown, the seed is usually dropped by hand in shallow drills. A sowing rate of 5 to 7 lb. per acre is sufficient. The plants should be thinned to a single spacing of 12 to 18 inches apart when four leaves are showing, the wider spacing being required for the mangold.

The leaves become yellow when the roots are ripe, which will be about seven months from the time of planting; hence these two crops are not, strictly speaking, winter and spring fodder crops. In this climate the roots should then be lifted, as otherwise the plants will run to seed. Unfortunately, temperatures in the Central District are too high to admit of safe storage for any considerable length of time, but the roots may be kept fairly well for short periods under a shed when thin layers are laid down with plenty of straw in between them.

Mammoth Long Red is a variety which has given good results, but intending growers should apply to the Department of Agriculture and Stock, giving a description of their soil, for suggestions as to the most suitable variety to grow.

C.—IN NORTH QUEENSLAND.

Throughout the areas of North Queensland in which general agriculture is practised the major portion of the annual rainfall normally occurs during the summer months, and good winter rains are the exception rather than the rule. In view of this and of the fact that the summer rains almost invariably are sufficiently reliable for the production of a number of bulky and nutritious summer fodder crops, it is essential that attention be paid to the production of these to provide the bulk of the annual fodder requirements. This applies particularly to the Atherton Tableland, where it is definitely unwise to depend upon results that may be obtained from autumn and winter sowings when the rainfall is usually light and unreliable. Nevertheless, it is considered advisable that every opportunity be taken to supplement the main summer production by making additional sowings of suitable fodder crops during the period from April to June. By doing so, a continuity of succulent fodder can be maintained in favourable seasons during the period from December to August to supplement the pastures, following which the conserved summer-grown reserves may be drawn upon to carry the stock over the critical dry spring and early summer period experienced in these areas usually up to the middle of November. Early storm

rains, which normally occur about that time, relieve the position by refreshing the pastures and enable quick maturing summer varieties of fodder crops to be sown.

In the annual cropping programme, provision should be made for setting apart a sufficient area of land to permit of a continuity of sowings of winter and spring fodder crops extending from April to June; in addition thereto, however, in order to utilise the interrow space in the late sowings of such row crops as maize, when seasonal conditions are favourable, a mixture of oats and rape should be broadcast therein. The latter procedure will furnish suitable additional fodder on these areas for use immediately following the grain harvest.

It is usually inadvisable to extend the main seasonal sowings beyond June, as, almost invariably, sowings made later than that month fail owing to the rainfall being insufficient to permit of crops reaching a profitable stage of growth.

Preparation of Seed-bed.

When land is required for autumn and winter sowing, it is most essential that it receive an early preparation, as the best results can only be expected when the land has received a deep ploughing late in summer, this being followed by sufficient shallow cultivations to maintain a good tilth until sowing time. Land so treated should contain ample soil moisture to ensure a good germination; furthermore, weed growth would be controlled, thus providing the clean firm seed-bed so essential to the best development of winter cereal crops.

Sowing.

In sowing, emphasis is placed on the value of drilling as against broadcasting. In addition to a saving in seed by the use of the seed drill, more even growth with a deeper and firmer root development is obtained, which enable cereals to withstand repeated grazings. Irrespective of the particular method of sowing that is used, it is considered a good practice to firm the surface of the sown area by means of a light roller. This is more particularly advisable on the light, deep volcanic type of soil, the surface of which is inclined to dry out rather rapidly.

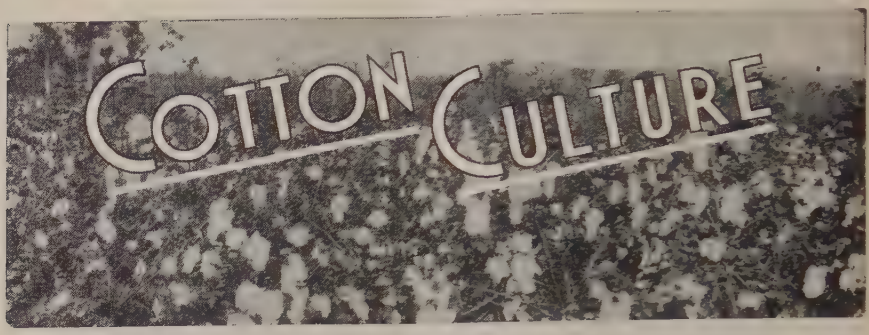
Suitable Crops.

The principal crops which yield the most productive results are mostly those particular varieties of oats, wheat, rye, and barley which are best adapted to grazing. At times, satisfactory hay crops are obtained from some varieties, but hay making is successful in North Queensland only under exceptional conditions. The following varieties of wheat have given satisfactory results for grazing purposes:—Florence, Cleveland, Warren, and Currawa. They should be sown during May and June at the rate of 50 to 60 lb. per acre, the latter rate of sowing being adopted in the case of broadcast crops. The most suitable varieties of oats are Algerian, Mulga, and Campbell's Prolific. The lastmentioned is a variety which is grown to only a limited extent in this State, but it has done well on the Atherton Tableland. Sowings should be made whenever conditions are suitable from March to May, the usual rate of sowing being 40 lb. per acre when drilled and 50 lb. per acre when sown broadcast.

Plate 63.

AUTUMN GROWTH OF OATS AND RYE SOWN IN MAIZE.

The addition of a suitable legume, or other fodder species, to the mixture sown, in order to enhance the food value of the resultant crop, is worthy of consideration. The following crops and varieties thereof are recommended for this purpose:—Dun and Grey or Partridge field pea, purple vetch, golden tare, and giant kangaroo or broadleaf Essex rape. The field pea is best sown as a mixture with a cereal such as wheat or oats in preference to being sown alone. Like the field pea, vetches or tares are best sown as a mixture with a cereal and should be sown in the same way. With respect to rape, Tableland conditions render it advisable, where possible, to sow the crop with a drill to ensure the seed coming in contact with the moist soil. It should be sown in drills just wide enough apart to permit of interrow cultivation to deal with weed growth until the crop becomes established. Sowing should be carried out at the rate of 4 to 8 lb. per acre according to the method adopted.



The Value of Early Ploughing for the Cotton Crop.

W. G. WELLS, Director of Cotton Culture.

THE yields of cotton which have been obtained in both investigations and commercial plantings in the districts south of Mackay have amply demonstrated the advisability of planting cotton in these areas only on land that has not been cropped more than three seasons following the breaking up of old grassland. In some instances, however, growers have failed to obtain satisfactory returns from crops planted on newly broken up grassland, especially old Rhodes grass pastures. An examination of the causes of low yields when good cultivation has been maintained, has usually indicated either that the crops were late planted or that they received insufficient rainfall to enable an early planted, heavily-laden crop to develop satisfactorily under stress conditions in December and January. In either case, in most seasons, had the land been ploughed early enough to conserve some of the late summer rainfall and to trap the autumn, winter and early spring rains, there would generally have been sufficient subsoil moisture to increase markedly the prospects of obtaining satisfactory yields.

The value of early ploughing for the cotton crop is not appreciated sufficiently by most cotton growers in these districts. Generally speaking, after June the rainfall is most irregular and uncertain until storms introduce the summer rains, yet many farmers do not plough their land for cotton until July or August, when the surface soil is often dry and hard. Good ploughing is impossible under these conditions and in addition the subsoil is generally dried out through the demands of the previous crop.

Late ploughed land usually requires a penetrating planting rain that will consolidate the seed bed and provide the moisture needed to obtain a satisfactory stand of cotton seedlings and to maintain them during the prolonged hot dry weather which is frequently experienced in the late spring or early summer. Unfortunately the rains received at the start of the regular planting period seldom penetrate beyond the depth of the ploughed soil. As the cotton stand obtained early in October in the Central District and in the second half of that month in the southern districts largely controls the chances of producing a good crop, most farmers plant then following the occurrence of a good germinating rain, hoping that further rain will occur in time to establish the resultant seedlings. If sufficient rain does not eventuate within the required period, then the crops may be completely lost or a thin stand survives which cannot exploit the full producing potentialities of the soil. In some seasons it may not be possible to replant until too late to

produce a profitable crop. It is obviously very important, therefore, to have ample supplies of subsoil moisture available at the start of the regular planting period to ensure the maintenance of the first stand obtainable.

Where late summer ploughing is done, there is usually less weed and grass growth in the following cotton cultivation than is the case where cotton is planted on an area ploughed late in the winter. In one demonstration conducted in the Upper Burnett, in a virgin pasture on a forest slope, mid-March ploughing was compared with May ploughing in a very dry autumn. Owing to lack of rain, planting was delayed until the 23rd of November. Although dry conditions broken by light storms, prevailed for the rest of the season, it was not possible to maintain clean cultivation in the later ploughed area with three cultivations with a disc cultivator, whereas at the end of the season the earlier ploughed area, which received only this number of cultivations, was more or less free of weed and grass growth. In addition a yield of 600 lb. seed cotton per acre was obtained as compared with approximately 400 lb. on the later ploughed area.

Numerous other illustrations have been obtained in demonstrations and in commercial plantings, of the advisability of ploughing land in late summer for the following crop of cotton. During the 1943-44 season at the Biloela Research Station, March and June ploughings of three year old Rhodes grass on forest alluvial clay loam have appreciably outyielded later ploughings of both Rhodes grass land and old cultivations. Although a very dry January affected yields, by the end of February 876 lb. seed cotton per acre had been picked in the March ploughed areas and 794 lb. in the June ploughings, with probably 200 lb. per acre more to open in each ploughing, as compared with an estimated total yield of not over 500 lb. for later ploughed Rhodes grass and less than that amount for old cultivations.

Soil moisture determinations indicated that at planting time early in October, the March ploughed areas were wet to 34 inches as compared with 22 inches in the June ploughing and only 17 inches in the August ploughed old cotton cultivations. As an inch of steady rain will penetrate only approximately 6 inches in dry firm soil of the clay loam soils on which most of the cotton of this State is grown, it would require at least six inches of penetrating rain occurring within a week to wet August ploughed land to the depth that was attained through the March ploughing.

It has been found at the Research Station that where isolated one-inch thunderstorms of the torrential type occur at mid-season after the ploughed soil has firmed, an average penetration of not over four inches may be obtained in flat alluvial, dry clay loams. Consequently it is only when very prolonged wet conditions are experienced that any marked penetration of rain to the lower subsoils occurs during mid-season. Soil moisture determinations have also shown that in many seasons the cotton crops grown on late July and August ploughed old cultivations at the Research Station have been produced with the moisture contained in the upper two feet of soil. As an early planted cotton crop will at mid-season practically exhaust the moisture from the upper foot of soil within a fortnight, such crops have been dependent on the regular occurrence of timely soaking rains to maintain a steady development of the plants and their fruiting systems. Where the rains have been delayed much past this period, checking of plant growth with a consequent shedding of flower buds and small bolls has resulted.

It can be realised, therefore, how cotton crops planted early on late ploughed areas are dependent on the occurrence of either frequent penetrating rains during January and February or good penetrating rainfall in October, early November and late December to provide sufficient subsoil moisture to enable the plants to withstand stress conditions in a dry January or February.

It is realized, of course, that under favourable conditions cotton crops grown on land ploughed even as late as the end of August may produce satisfactory returns. Such results have occurred, however, mostly when the plantings have been made after good rains prior to mid-November, and exceptionally good rains have fallen in December, followed by dryish conditions during January and good rainfall in February. The plants had thus enough moisture to promote a steady slow growth until the December rainfall provided ample subsoil moisture. The dryish conditions in January prevented rank growth occurring as a result of the December rainfall, and then the February rains were sufficient to continue the development and maturation of the crop. Unfortunately such ideal conditions do not occur each season for, as a rule, a stress period is experienced some time in the growth of the crops and in the absence of adequate subsoil moisture, the plants react severely.

It is urged, therefore, that growers make every effort to plough for cotton during March or early April and if possible use old grassland. If this is not available, then, where a small acreage of cotton is to be planted, land that has been under either Sudan grass or giant setaria (giant panicum) may be used. Under no circumstances should cotton be planted following either Japanese millet or white panicum owing to the extra cultivation costs incurred as a result of the volunteer seedling growths from these crops. Where a large area is to be planted and the required acreage of grassland for early ploughing cannot be obtained as much grassland should be ploughed as possible and the remainder of the intended area made up from land that is in the second year of cotton following grassland or failing that, land that has been in Sudan grass or giant setaria. In this way early ploughing of all but the cotton land can be done. By removing the old plants as fast as the crop is harvested and following quickly with the ploughing, it may be possible to plough the cotton land in time to conserve much of any late autumn and winter rainfall experienced. The second year cotton land generally should also be sufficiently permeable to trap efficiently most of the summer rainfall, especially prior to the cessation of the cultivation operations.

It is strongly stressed, however, that cotton should not follow cotton if the land has been three years or more out of grassland, unless irrigation facilities are available. It is this practice that is largely responsible for the poor yields obtained by a large number of farmers each season.

It is also urged that, where land has been ploughed early and a wet autumn or early winter has made it necessary to cross plough, only a light skim cross ploughing be done in order that the least possible drying out of the subsoil will be caused. Deep cross ploughing dries out not only the loose surface soil but also the upper subsoil. Consequently very good planting rains will be required to obtain a satisfactory germination and to maintain the resultant seedlings until they are thoroughly established.

From the results which have been obtained in demonstrations and commercial plantings, early ploughing can be expected to increase appreciably the average yield of cotton per acre in most seasons and should therefore be practised by all cotton growers.

Packing Houses and their Equipment.

JAS. H. GREGORY, Instructor in Fruit Packing.

Packing Sheds.

THE prevailing shortage of manpower makes it necessary for growers to use every method that will expedite the handling and packing of fruit consignments. As war conditions have made it difficult to obtain supplies of shed equipment it is felt that information on packing houses and their accessories would be of assistance to growers desiring to erect or equip their own packing sheds. The writer has often noticed the inefficient methods of handling fruit crops on properties where no effort has been made to shorten the time required for casemaking, packing, and despatching by the use of packing-shed accessories. The increased speed and ease of handling would soon recompense growers for their outlay on packing and casemaking benches, conveyors, &c.

Packing Shed Equipment and Shed Layout for Fruits such as Apples, Pears, Citrus, and Stone Fruits.

In dealing with packing sheds it is essential to study economy of working. This is attained by having the work going or moving in one direction through the shed, so that the packers and floorman nailing down and despatching do not get in each others' way whilst working; receiving and having fruit stacked in places to permit as short a distance as possible of movement to sizing machines or packing bins; gravity conveyors, if possible, to carry cased fruit to lidding press or trucks. A study of the two packing-shed layouts submitted will help to show how the work is arranged to obtain these results.

The design of the large shed (Plate 64) is suitable for the handling of an output of 2,000 to 3,000 cases per week if fruit can be loaded daily on rail. This plant would be suitable for small co-operative companies and central community packing houses.

The smaller shed illustrated (Plate 65) is very suitable for the average grower, allowing easy handling of 250 cases a day. If the grower has not available gravity conveyors and nailing-down press, a good nailing-down stand is made by laying two pieces of 3 by 2 or other suitable timber on the floor for nailing down upon. These battens permit the bottom of the cases to bulge when the lid is placed in position and nailed. As will be seen by examining the diagram the same principle of continuity from the reception of the fruit to its despatch is followed as in the larger shed.

It will be seen the plant required in the packing shed is confined to casemaking bench, packing stands, sizer, and accessories for casemaking and packing. A description of how to make these will help the home carpenter.

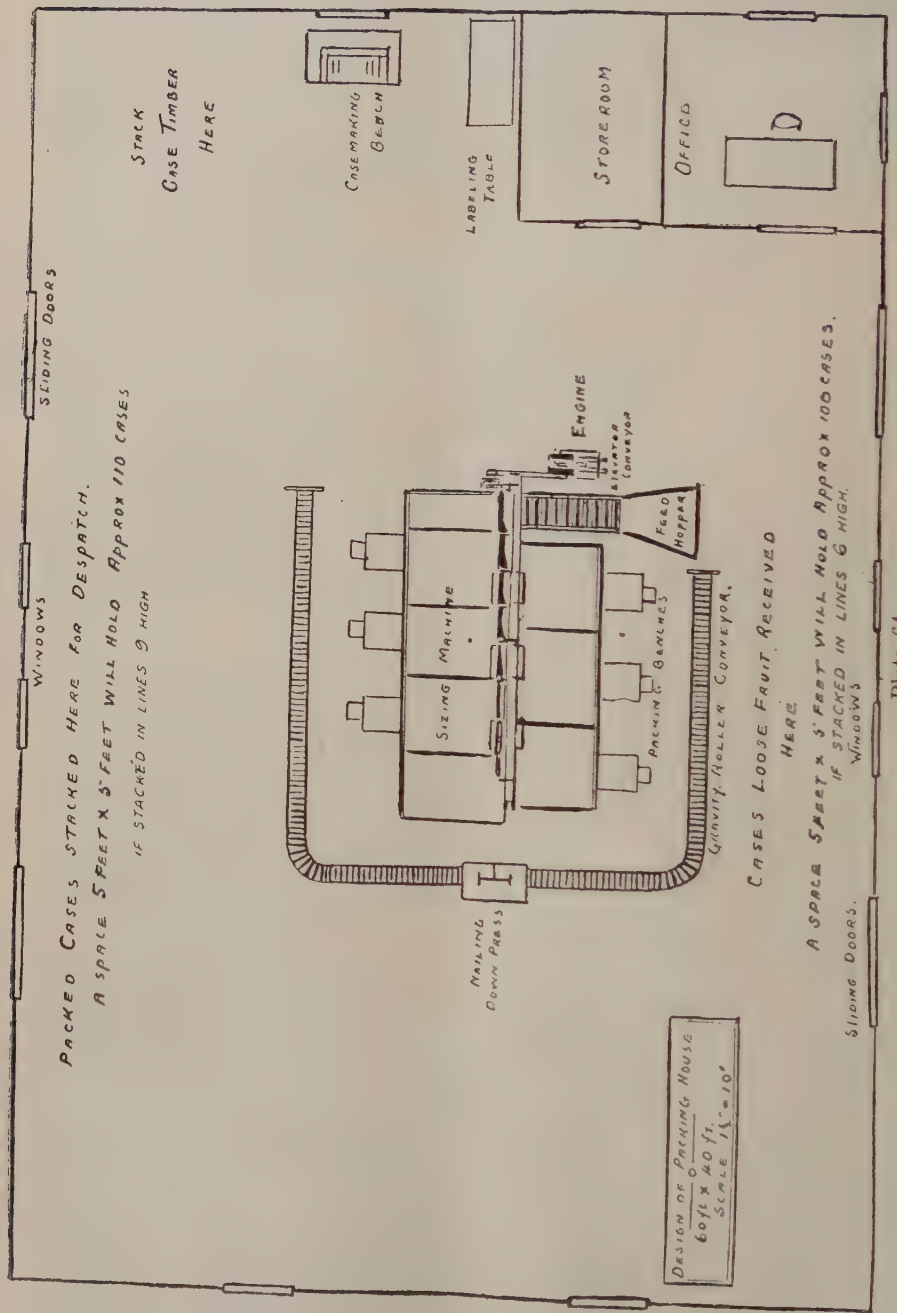


Plate 64.

SUGGESTED LAYOUT FOR LARGE PACKING SHED, USING DOUBLE-SIDED SIZING MACHINE AND ROLLER CONVEYORS.

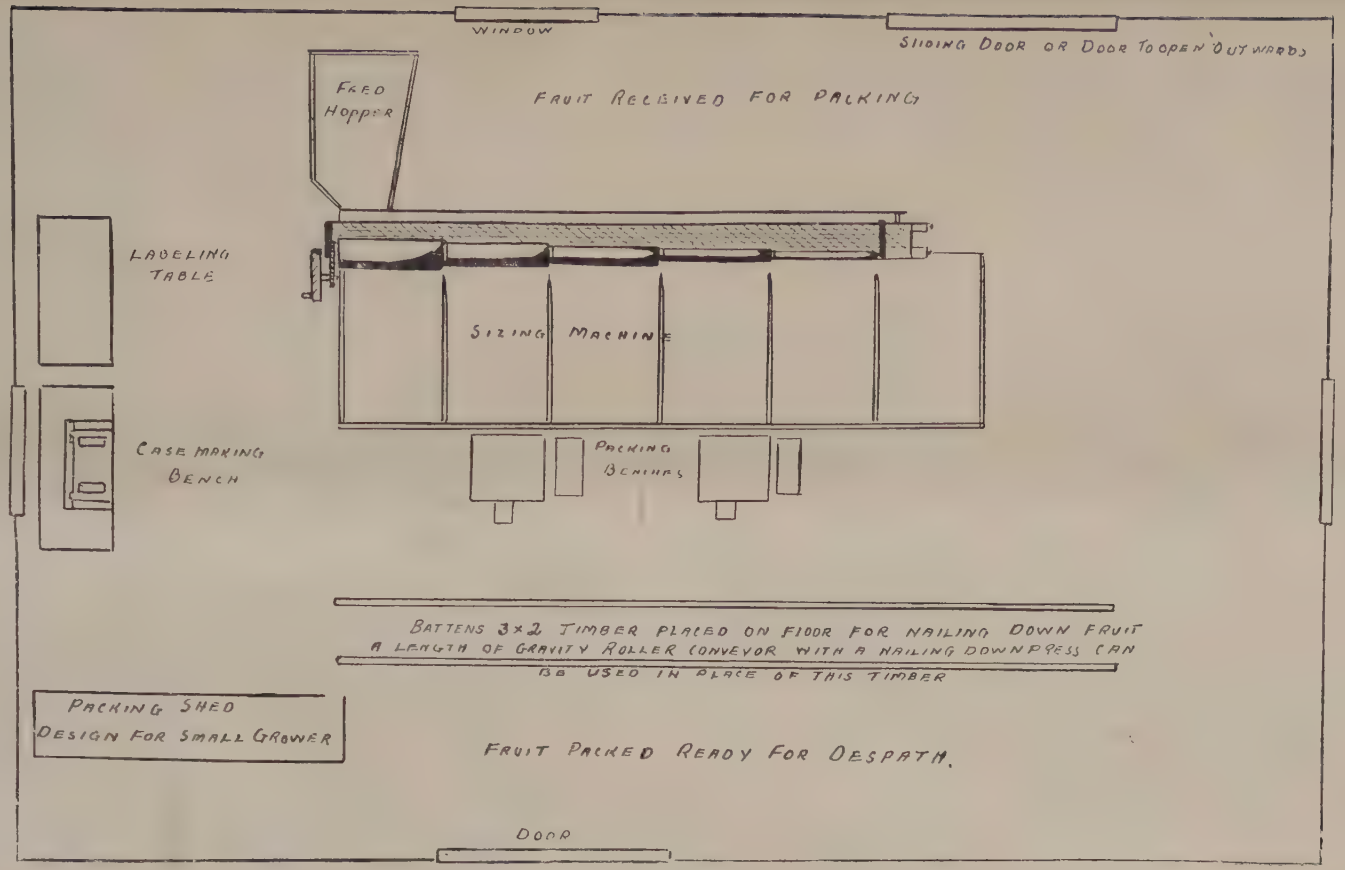

WINDOW
SLIDING DOOR OR DOOR TO OPEN OUTWARDS
FRUIT RECEIVED FOR PACKING
FEED HOPPER
LABELING TABLE
SIZING MACHINE
CASE MAKING BENCH
PACKING BENCHES
BATTENS 3×2 TIMBER PLACED ON FLOOR FOR NAILING DOWN FRUIT
A LENGTH OF GRAVITY ROLLER CONVEYOR WITH A NAILING DOWN PRESS CAN
BE USED IN PLACE OF THIS TIMBER
PACKING SHED
DESIGN FOR SMALL GROWER
FRUIT PACKED READY FOR DESPATH.
DOOR

Plate 65.

Small Shed Equipped with Single-sided Sizing Machine Suitable for the Average Small Orchard.

Particulars of Sizing Machine (see Plate 66).

The pulleys (A) can be made from any round timber, a diameter of 6 inches being suitable.

The turning wheel (B) is not absolutely necessary but the addition of this assists greatly in the easy running of the machine.

The grading or sizing board (C) can be made like either of the shapes shown. If made with each size stepped as shown, each step is ¼ inch. The board should be mounted on brackets and slotted to enable the board to be adjusted for smaller or larger fruit so that the fruit can be sized into any of the bins. The distance from the bottom edge of each step on the board, to the belt, should equal the diameter of the fruit to be sized into each bin. Where the run of fruit is large, i.e., 2½ inches and larger, the board can be raised so that the first step marked 2¼ inches is raised to 2½ inches enabling all the bins to be used.

The board (D) to support the belt which carries the fruit, should be planed smooth and free from anything likely to catch or cause wear on the belt. The belt (E) for this machine should be made of heavy canvas or other suitable material and should be at least 5 inches in width. The iron supporting brackets (F) to hold the sizing board (C), should be slotted to enable the board to be adjusted higher or lower as required.

If a revolving roller is used instead of the fixed board, it can be made out of a length of galvanised water piping, minimum 2 inches in diameter or the wooden centre of a paper or lino. roll.

This sizer will not be altogether suitable for sizing mandarins or tomatoes.

Particulars of Hand-sizing Gauge.

A handy sizing gauge can be made by cutting holes 2 inches, 2¼ inches, 2½ inches, 2¾ inches, 3 inches, and 3½ inches in diameter in a piece of plywood 24 inches x 6 inches (Plate 76). Packers will find it helpful to mark the size of the hole plainly on the gauge opposite each sizing hole. The pack and count which is used for fruit of that particular size can also be printed in and will assist new packers. It must be noted that a 2¼-inch fruit is one that will drop through a 2½-inch ring but not through a 2¼-inch ring, and so on. The same idea can be used on a smaller scale for making a sizing board for plums, with holes 1⅞ inch, 1¼ inch, 1⅜ inch, 1½ inch, 1⅝ inch. By printing the names of the varieties of plums alongside the hole which measures the minimum diameter permitted for market with that variety, the grower will have a first-hand guide available for use when necessary during the marketing period.

Casemaking Bench.

The cost of timber is approximately £1, and the price will be repaid many times during a season by the increased output and with the advantage of a better-made box. The illustration (Plate 67) shows the complete bench made to take cases without a partition, whilst Plate 68 is the top of the bench which would replace the top of Plate 67 if the bench was to be used for making cases with a partition. Cases are always measured by the internal dimensions, so it is necessary to always take care that the inside length of the case corresponds to the distance between the notches in the back stop (A) (Plates 67 and 68). Some growers use a tree stump for a bench. This is quite a good base for a bench and will do excellent

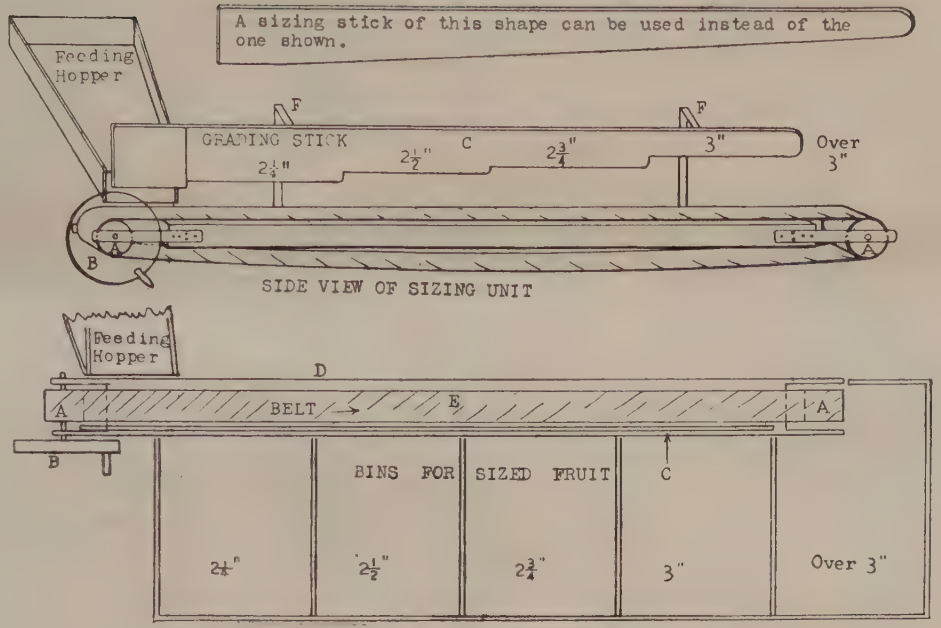
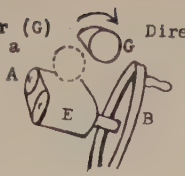


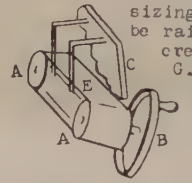
Plate 66.

PLANS FOR A HOME-MADE SIZING UNIT.

Showing a roller (G) used instead of a fixed board.



D. Board to support fruit carrying belt.
E. Carrying belt for fruit.
F. Iron supports for sizing board. These should be made adjustable to enable the sizing board to be raised or lowered.
G. Revolving roller which can be used instead of a fixed board.



END VIEW.
Sizing belt tilted to enable fruit to run off machine.

Method of fixing pulley for carrying belt.
A Belt Pulley
B. Wheel to turn grader.
C. Sizing stick or board.

work by adding just the bench stops to the top of the stump. When attaching the legs on the bench they should be placed as nearly as possible under the slots that hold the case ends. This gives a solid base for nailing.

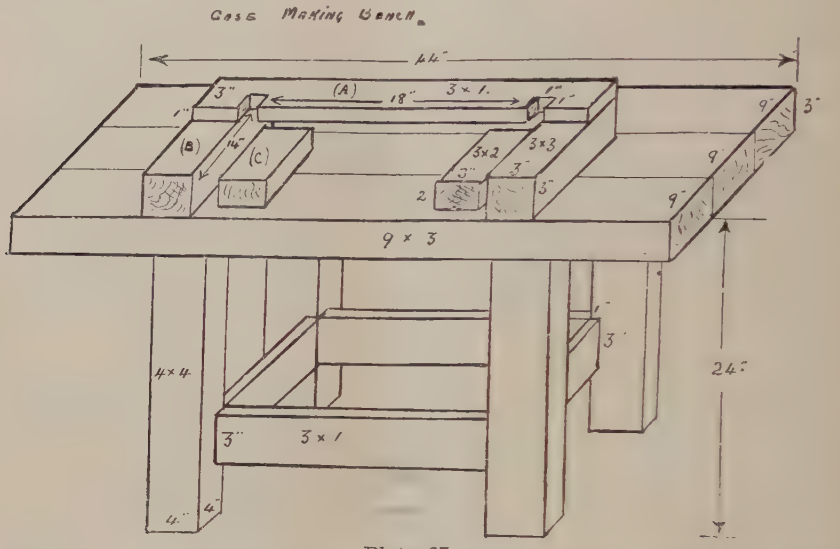


Plate 67.

CASEMAKING BENCH FOR MAKING AUSTRALIAN DUMP, CANADIAN STANDARD, BUSHEL AND HALF-BUSHEL CASES, AND OTHER FRUIT CASES, 18 INCHES IN LENGTH, INSIDE DIMENSIONS.

Specifications.

Height	.. 24 inches from floor	Timber.—Legs	.. .. 4" x 4"
Width	.. 27 inches	Inside	.. 3" x 2" (C)
Length	.. 44 inches	Stops—outside	.. 3" x 3" (B)
		Back	.. 3" x 1" (A)
		Top	.. 9" x 3"
		Stays	.. 3" x 1"

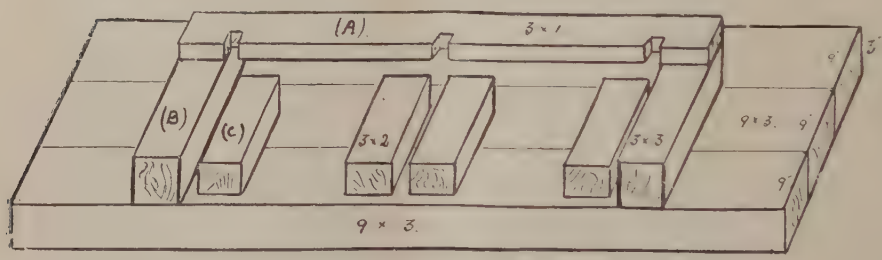


Plate 68.

CASEMAKING BENCH FOR MAKING LONG BUSHEL CASES OR OTHER CASES WITH A PARTITION.

Casemakers' Nail Comb.

As a help to casemakers a nail comb (Fig. 69) for picking nails up with the heads in one direction will be found useful. The comb is made of a heavy piece of galvanized iron turned to clip on to the end of the nail box with a number of knitting needles soldered to the iron. The knitting needles are placed so that nails will slide between them easily.

without dropping through, and remaining suspended by their heads in the comb. A comb with up to sixteen needles is a handy size for working, and will hold enough to make ten to fifteen cases. The needles are best placed with the ends shaped in a circular manner, the centre needles projecting about 6 inches and the side needles 5 inches. The comb is used by scraping or pushing it through the nails in the box. The cost of the comb is the price of four sets of knitting needles, and the necessary solder (approximate cost 2s. 6d. in most country districts).

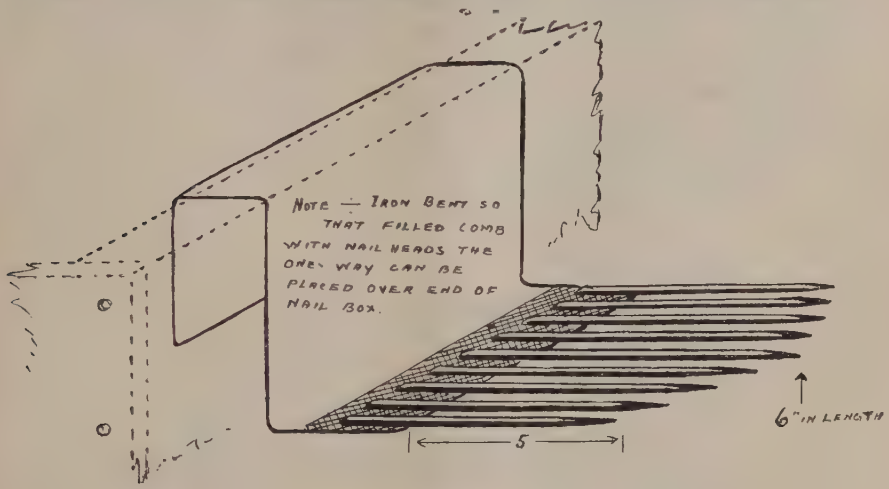


Plate 69.

CASEMAKER'S COMB.—Made of galvanised iron and knitting needles.

Fruit Packing Bench.

Packing is a tiring work and a job that cannot be done properly, as some packers think, by sitting down. Many growers make no effort to make packing easy, and often condemn packing fruit such as tomatoes as too hard, simply because they endeavour to pack with their case level and have difficulty in getting the fruit to remain in place. This difficulty can be overcome by building the packing stand illustrated in Plate 70 with one end of the case higher than the other. With this stand packing is done from one end of the case and not from the side. This allows the tilt on the case to keep the fruit in position without the packer having to hold it in with one hand as when packing from the side, thus leaving both of the packer's hands free for working. The packing stand illustrated is for use when wrapping fruit, but with fruit such as tomatoes, passion fruit, or other unwrapped fruit it is not necessary to have the tray for holding the wrapping paper. The paper-holder is best made to take the largest sized paper used in wrapping citrus and deciduous fruits. If made 4 inches deep at the back and 2 inches deep in front, with the front cut out in the centre as illustrated, a large quantity of paper can be held in the holder. The paper-holder should be placed at the height most suitable for the comfort of the packer. The packing needle illustrated in Fig. 71 is a useful addition to the packing bench, with paper-holder.

Spring Board for the Comfort of the Packer.

Illustrated with the packing stand is an easily made accessory to ensure comfort and ease for a long day's packing. Standing on a hard

cement or wooden floor all day whilst packing is very hard on most packers, particularly female operatives. Nearing the end of the day a packer's output for the last couple of hours is often curtailed through aching legs and back. This can be largely overcome if not entirely eliminated by the use of a spring board to stand upon (Plate 70). Made from timber surrounding bales of wrapping paper the cost is nil, but the expenditure of a few pence on 6 feet of 6 by ½ inch timber for the top and 3 feet of 2 by 2 inch for the two battens at the ends will soon be repaid by the extra comfort and efficiency given. The cost of the packing stand and spring board should not exceed 40s. complete.

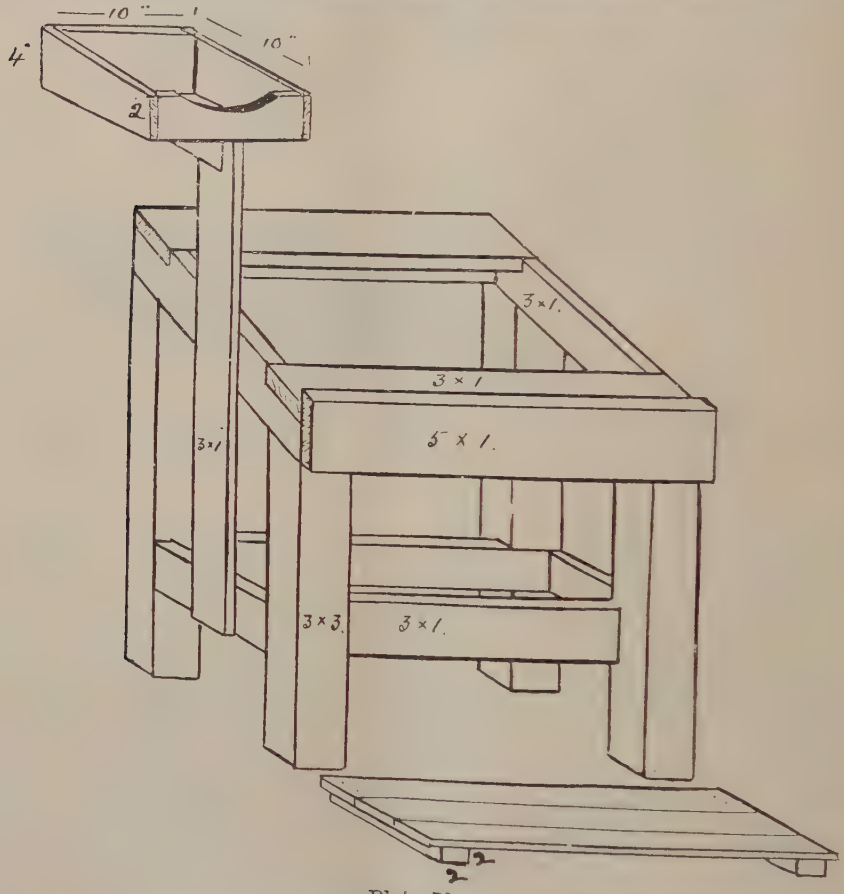


Plate 70.

FRUIT PACKING BENCH AND SPRING BOARD.

Specifications.

Height in front	..	22″
Height at back	..	27″
Depth from front to back		18″
Size of Paper Tray	..	10″ x 10″ Inside Dimensions
Legs	..	3″ x 3″
Stays	..	3″ x 1″
Front board ..	..	5″ x 1″

Wrapping Paper Needle Holder.

This is a useful accessory, and when used in conjunction with the wrapping-paper holder will be found to be a good insurance against paper wastage. It is simple to make, using a small sheet of heavy galvanized iron, copper, or brass cut and bent to the required shape to allow the needle to slide up and down through it. The needle is made of a 15-inch length of a heavy gauge galvanized or fencing wire, turned over 4 inches from one end and pointed to make the needle. The turn should be made to allow about 1 inch between the needle and the sliding portion holding the weight. The sliding portion should be filed square to enable it to slide through the supporting plate. A phonograph needle fitted in the end of the needle portion is an improvement on just pointing the wire. The needle can be fitted by drilling and soldering or by putting a thread on the end with a set nut. The weight is made of lead, and needs to be about 6 ounces in weight. The cost of this accessory (Plate 71) is practically only that of the labour.

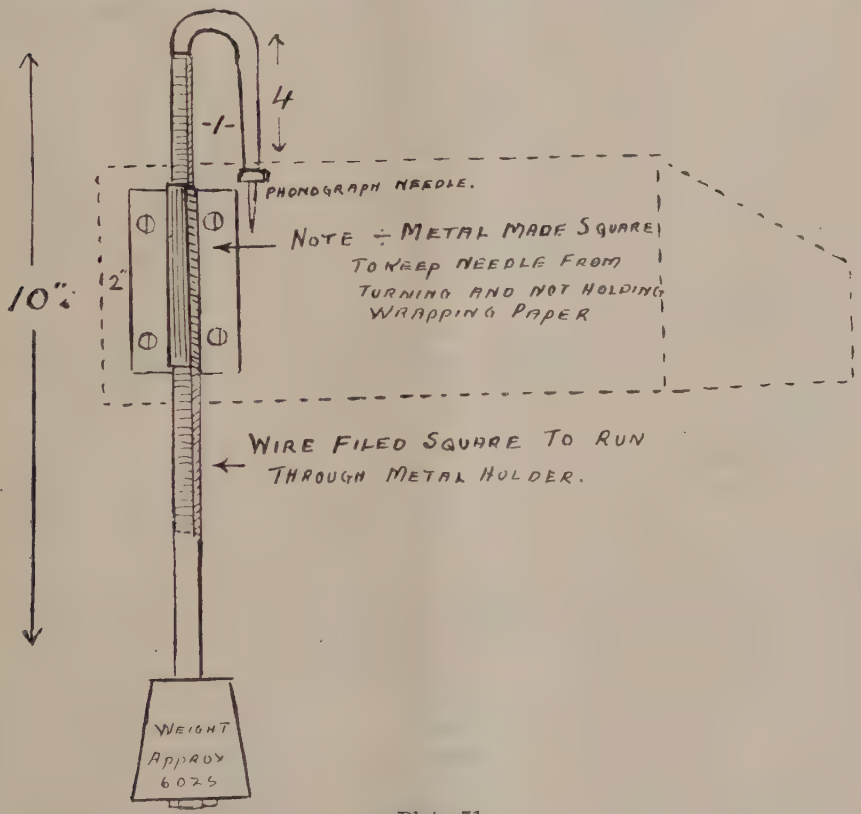

4
1
PHONOGRAPH NEEDLE.
NOTE ÷ METAL MADE SQUARE TO KEEP NEEDLE FROM TURNING AND NOT HOLDING WRAPPING PAPER
10"
2"
WIRE FILED SQUARE TO RUN THROUGH METAL HOLDER.
WEIGHT APPROX 6 OZS

Plate 71.

PACKER'S NEEDLE TO HOLD WRAPPING PAPER IN POSITION.—The paper holder is represented by dotted lines. The weight should be about 6 ounces.

Case-end Scraper.

A cheap and efficient case-end scraper for removing dirt or stencil ink smudges can be made out of an old file shaped and sharpened (Plate 72). Any blacksmith will make this tool for a few pence, and it will be most useful in the packing house.

Fruit Case Lidding Press.

No packing shed should be without this accessory. Whilst there are many excellent presses on the market, some growers may prefer to make their own. The cost of the timber and materials for the press is about 10s. The materials necessary are 8 feet of 3 by 3 for the legs, 28 feet of 3 by 1, two bolts 3 inches long, and four 1½-inch screws with washers to match. Two-inch nails will be found long enough. The short lengths of wire required for the press vary in length according to the case used, and require to be made of heavy-gauge wire. The short lengths of 2 by 1 and 1 by 1 timber required for the stops and press (see Plate 73) can be cut from a piece of 3 by 1 ripped down. It is necessary to allow about 4 inches clearance of the top of the press above the case to allow for variations of the height of the fruit in the case, and the amount of bulge required on the lid when nailing down. A close examination of the illustrations will show how to build the press. The wires are attached to the pressing stays by drilling the wood with two holes about 1 inch apart and bending the wire to fit. Care should be taken to see that the end of the wire does not project through and damage the lids when pressing. The bottom end of the wire is attached to the stays by the 1½-inch screws and washers, an eye being formed by carefully bending the wire to fit around the screws. It is necessary to have the wire hinged in this way to enable the pressure stays to be brought easily over the lid of the case. The ends of the two pieces of wood placed across the frame, on which to stand each end of the case when attaching the lid, should be allowed to project on either side and be shaped to stop the wires from falling flat over either end of the frame. This saves a lot of reaching for the press when operating.

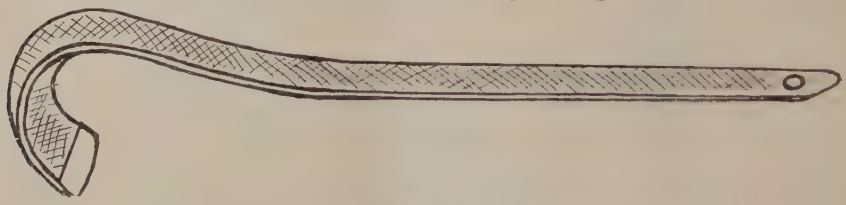


Plate 72.

CASE-END SCRAPER.—Made from an old file or rasp.

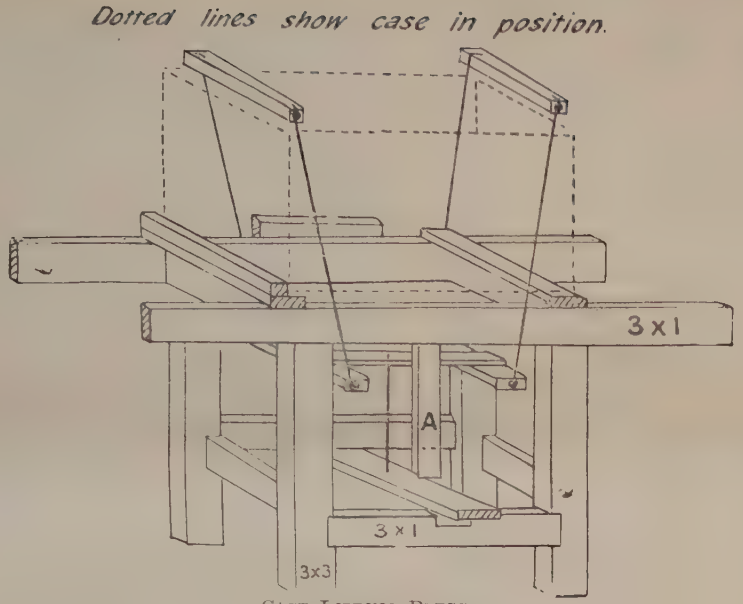
Stencils.

Stencils are another necessity in the packing house, a grower needing sets of stencils for all varieties of fruit, sizes, and packing counts used; also a stencil plate with his name and full address as follows:—

J. SMITH,
Stanthorpe,
Queensland,
Australia.

This is necessary when a grower is going to export. A spare sheet of light gauge zinc, out of which stencils can be cut with a pocket knife, is a handy standby for emergencies. Thick papers, such as malthoid or paper mulch for pineapple plants, may be used in emergencies.

A good inkpot to use for stencilling is easily made out of the bottom of a kerosene tin and a handful of cotton waste, a block of stencil ink, and the necessary water to saturate it without having any surplus. A block of stencil ink used this way, will go many times as far as when used on a board as is the general practice.

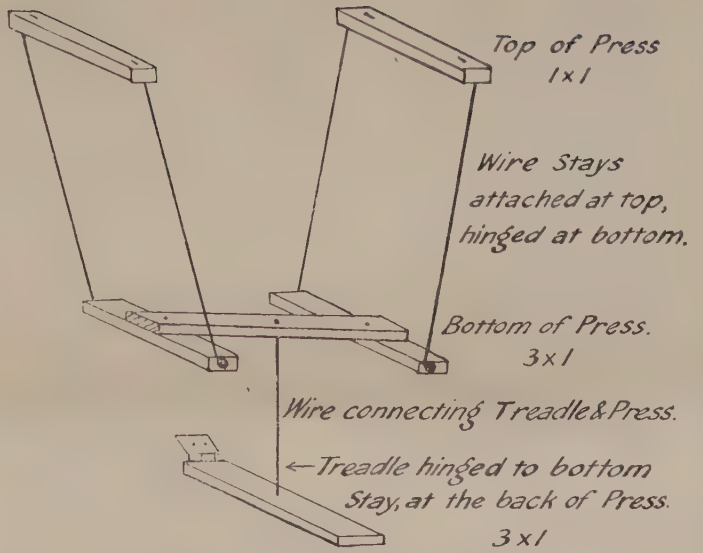


Case Lidding Press.

Specifications.

Length	..	4 feet
Width	..	12½ inches
Height	..	2 feet
Timber—Legs		3″ x 3″
Frame		3″ x 1″

(A) This is a board hinged to the top rest, bearing on the treadle and holding down the lid whilst nailing, thus making it unnecessary to keep pressure on the treadle with the foot.



Press with Framework Removed.

Length of wires 19 inches for standard case.
Length of bottom wire 12 inches.

Plate 73.
Fruit Case Lidding Press.

Paste for Labels.

Growers using labels will find that ordinary flour paste is quite satisfactory for attaching labels. The addition of a small quantity of alum or bluestone will assist in keeping the paste indefinitely. Care should be taken to keep paste with bluestone added in enamel or porcelain containers only, as bluestone will soon corrode tinware.

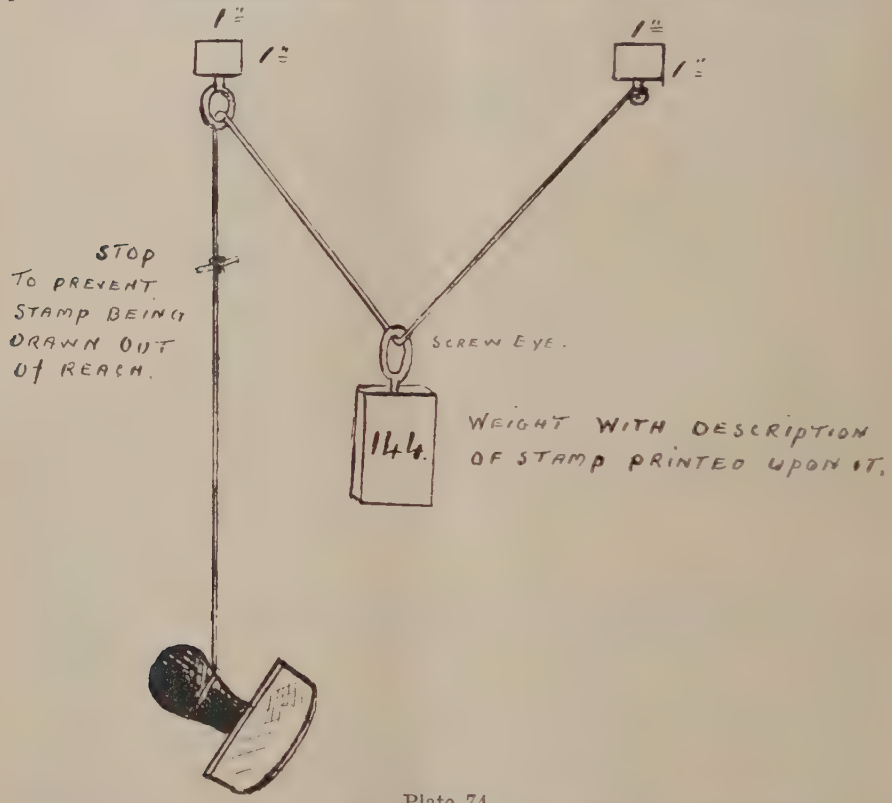


Plate 74.
METHOD OF ATTACHING RUBBER STAMPS TO HANG OVER PACKING BENCHES.

Rubber Stamps.

If rubber stamps are used instead of stencil plates they can be placed over the sizing machines and packing benches on weighted strings, so that the packers will have them in easy reach and when used they will rise out of the way of the packer until required again. Rubber stamps should always be made with a convex face (Plate 74), so that the stamp will print easily on the wooden end of cases. If made flat stamps will not print satisfactorily when slightly uneven ends are encountered.

Other necessary accessories for those sending fruit where it has to be handled more than once are wire-tying machines which save a lot of damage to cases. Corrugated case-end fasteners are also useful, repairs to split ends being quickly and neatly effected by this means. A time-saving implement for those who have a trade in small case lots and use tacks is a magazine label attacher. This will attach a label in one-tenth the time required with a hammer and tacks. The accessories described are necessary to all growers who desire to handle their fruit

in as quick and economical a way as possible, and they should materially help in putting up an article that will compete, both inside and out, with any other article on any market in a way that will be a credit to Australia.

Tomato Packing Shed Equipment.

Where growers have not a suitable mechanical sizer (most ordinary commercial sizing machines have very low efficiency for tomatoes) they will find it a great help if a multi-compartment, hand-sizing and packing bench is built as illustrated (Plate 75).

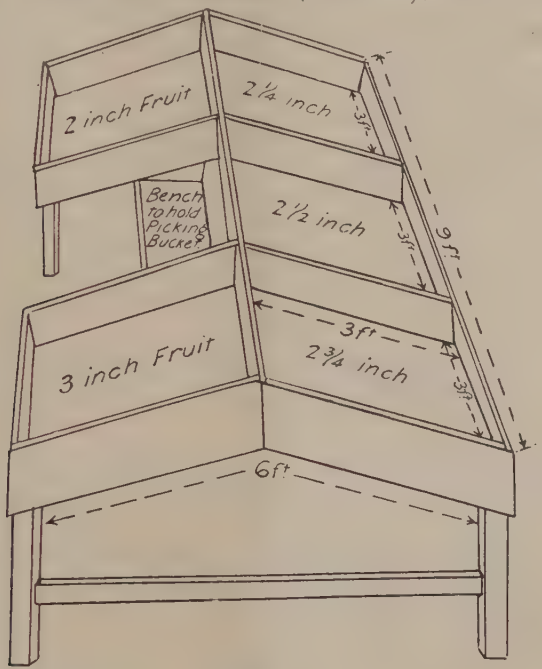


Plate 75.

Sizing Table.—Diagram of sizing table containing bins for five sizes of tomatoes, and a space with bench built in to accommodate sizing operative.

Note.—This table should not be made too big, as this will cause rough handling of fruit.

For the successful packing of tomatoes sizing is absolutely necessary, and must be done before proceeding to pack. It is possible with citrus, apples, or pears to pack without sizing first, but with tomatoes it is essential to size first. At present we do not know of any sizer that is a complete success for sizing tomatoes, but the revolving roller and moving belt type of appliance is a big help. The best method for the grower with a small acreage is a sizing table, a diagram of which is shown (Plate 75). This can easily be made at home. It is necessary to have the centre raised to allow the fruit to run to the edges of the table where the packers are working. This saves reaching for fruit. Packing operations are conducted from the sides of the bins or compartments of the table. To save throwing or rough handling on the part of the operator sizing the fruit, it is advisable not to make the table too big. Benches 3 feet by 3 feet are a good size; this would mean a table 9 feet long by 6 feet wide. There are five compartments for sizing, the space

in the middle at one side being used by the sizer to stand in whilst working. A bench for standing the packing bucket on is a great convenience and time saver—allowing the sizer to use both hands for operations. Best results will be obtained where it is possible always to have the sizing done by the same person, who will soon become very fast and expert. This bench, used in conjunction with case-making benches, &c. (Plates 67, 69, 70, 72) and other accessories described, will enable tomato-growers to accelerate greatly the speed of their output.

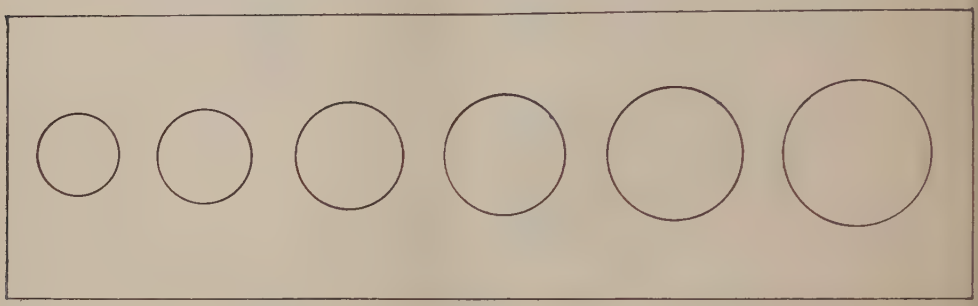


Plate 76.

HAND-SIZING GAUGE.—The holes can be cut in plywood with an expansion bit or washcutter, 1½ inch being the distance of the edge of the 3-inch hole from the edge of the board with a distance of 1¼ inch between the edges of each hole.

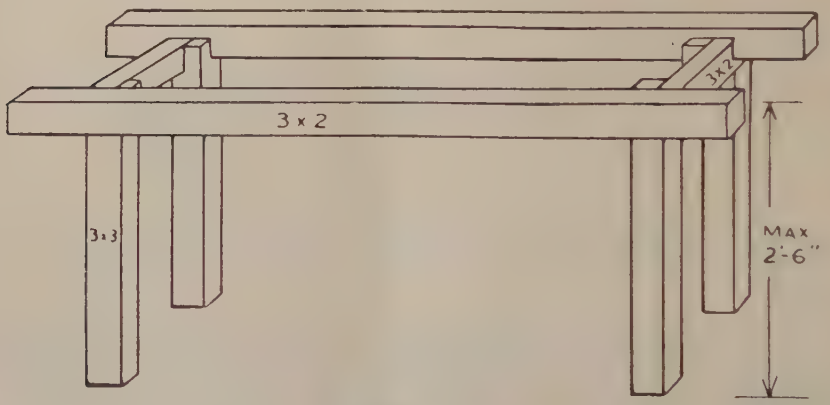


Plate 77.

NAILING-DOWN STAND SUITABLE FOR TOMATOES, PASSION FRUIT, PEACHES, AND SIMILAR FRUITS PACKED IN HALF-BUSHEL CASES.

Passion Fruit Shed Equipment.

The same case-making benches as used for citrus, stone fruits, &c., may be used for the making up of passion fruit cases, but the addition of a nailing-down stand in the shed is helpful in making the work easier. This stand can be made any length to suit the particular

activities of the grower. A study of the illustration in Plate 77 is all that is necessary to enable the stand to be built. The case supports should be placed approximately 16 inches apart. This will permit the bottom of the case to bulge slightly when the case is nailed down.

Home-made Sizing Machine.

Anybody able to use tools will find no difficulties in making the suggested sizer. The sizer is of a semi-gravity type, the rollers being placed in an inclined position to assist the fruit in running over the rollers. The fruit is fed on to the highest end of the rollers. These are placed with the ends receiving the fruit close together, the rollers being so adjusted that the space between gradually widens as it reaches the opposite ends. In operation the smallest fruit drops through first, the large sizes having to run down the roller before the space becomes wide enough to permit it to fall through into the receiving bins. As the incline on the rollers is insufficient for the fruit to travel without assistance a spiral worm of rubber is placed on each roller to assist the fruit from one end to the other. An examination of the diagram (Plates 78 and 79) will show the principles of construction of the sizing unit. The following materials will be necessary for a machine with 9-feet rollers:—

One flywheel (D), approximately 12 inches in diameter.

Two gear wheels (H), approximately 5 inches in diameter with ½-inch mesh for gears.

Four short lengths of shafting, 3 lengths 9 inches long, 1 length 12 inches long. (The gear wheels and flywheel are to be mounted on the shafting for driving purposes.)

Four bearings (E). (These are not necessary if hand power only is to be used, wooden bearings then being suitable.)

Two wooden rollers (A), 9 feet x 3½ to 4 inches in diameter. (A shorter length can be used for a smaller machine.)

Sufficient ½-inch thick sheet sponge rubber to completely cover the rollers and make the spiral drive on each roller.

Eight bolts, ½-inch x 5 inches for mounting bearings.

The following timber is necessary to construct sizing unit only:—

Two pieces for placing on each side of the roller (B Plate 8) 9 feet 2 inches x 6 inches x ½-inch boards. (To be 2 inches longer than the rollers, to allow for fastening.)

Two pieces for mounting bearings, each 12 inches, 3 inches x 3 inches.

Two pieces for centre uprights to mount unit on.

One piece for stay between unit uprights, 10 feet, 3 inches x 2 inches.

The unit can be fitted with either single or double-sided bins. The bins can be made in size to suit the operations of each individual grower. They are easily built on to the unit using the end uprights as centre legs at either end. As the feed of sized fruit is at the centre between the rollers, no difficulty should be experienced in running the sized fruit to either side of the machine ready for packing. A study of Plate 9 will show the method of building the double-sided machine. A single-sided machine presents no difficulties to the builder.

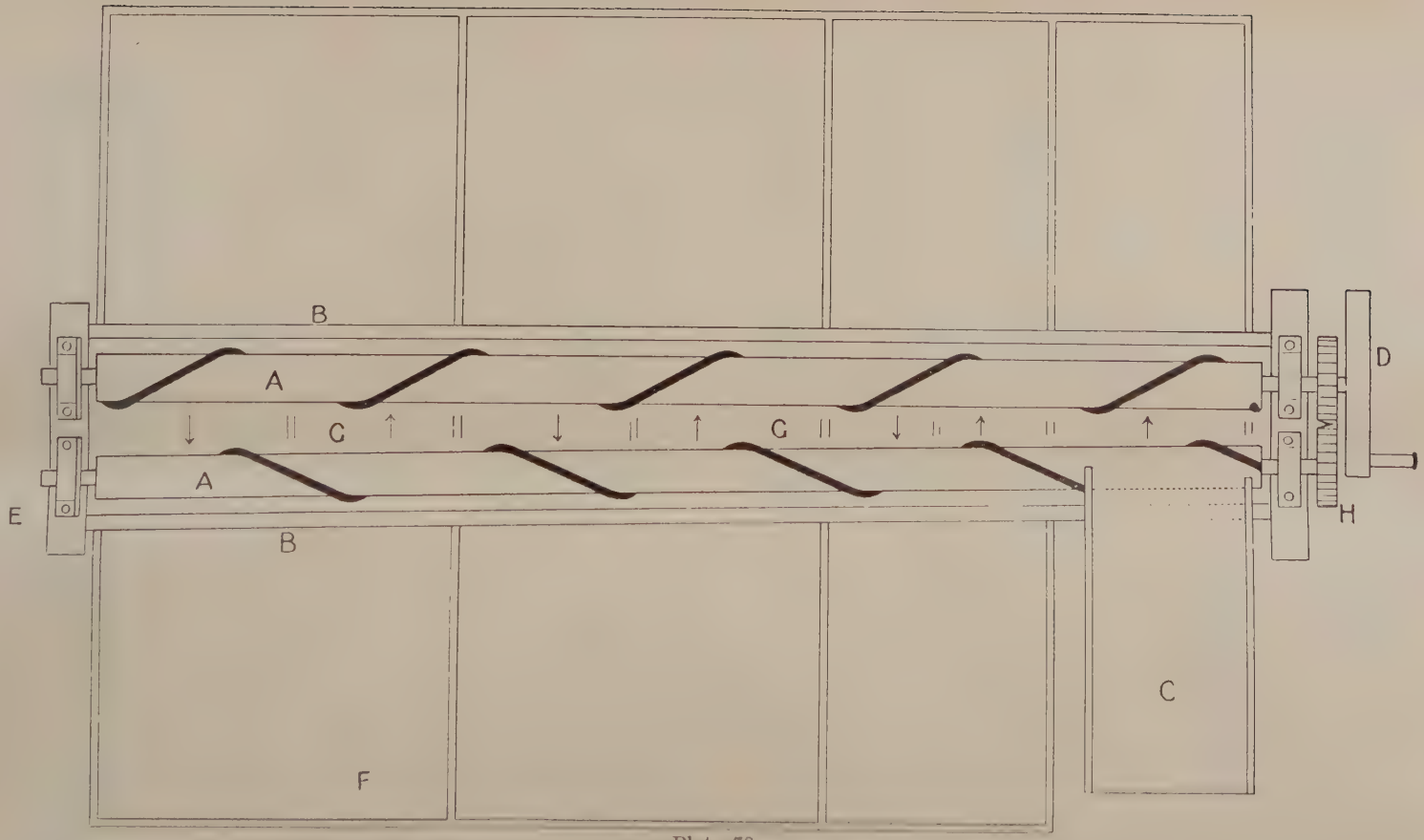


Plate 78.

PLAN OF MECHANICAL SIZING MACHINE FOR PASSIONS.

A. Sponge rubber-covered wooden rollers.
B. Two 6-inch by ½ inch boards on outside of rollers to prevent fruit from running off rollers.
C. Feed hopper.
D. Flywheel and handle. For a left-hand drive this should be fixed to the other roller.
E. Movable bearing to widen or close rollers. The roller with turning handle should be permanently fixed.
F. Receiving bins for fruit.
G. Space between rollers through which the sized fruit falls into receiving bins.

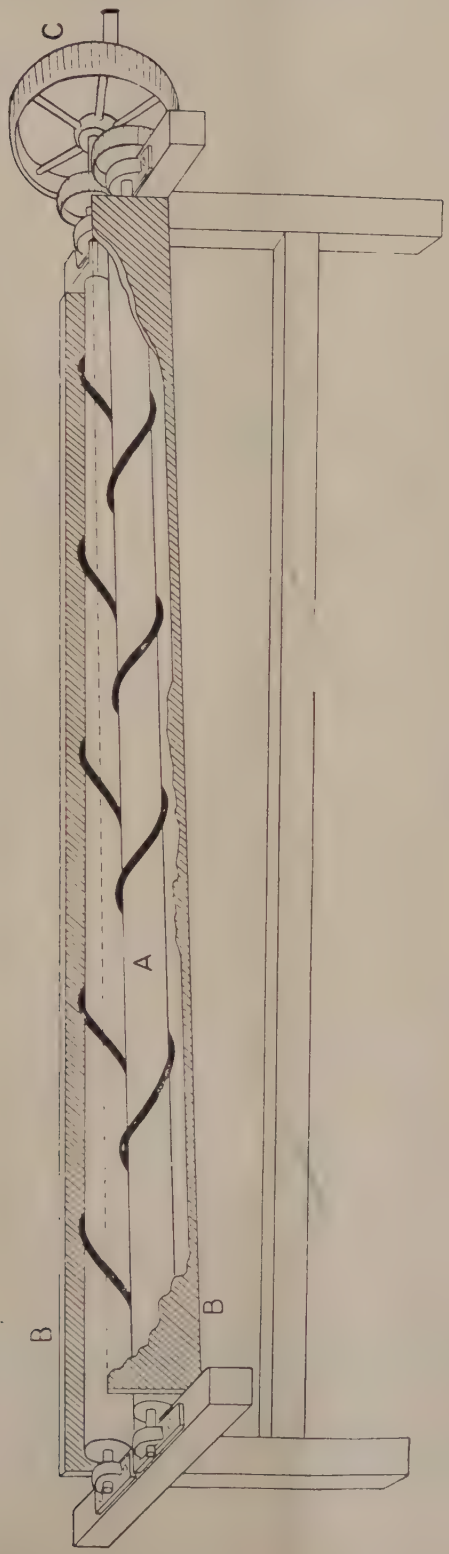
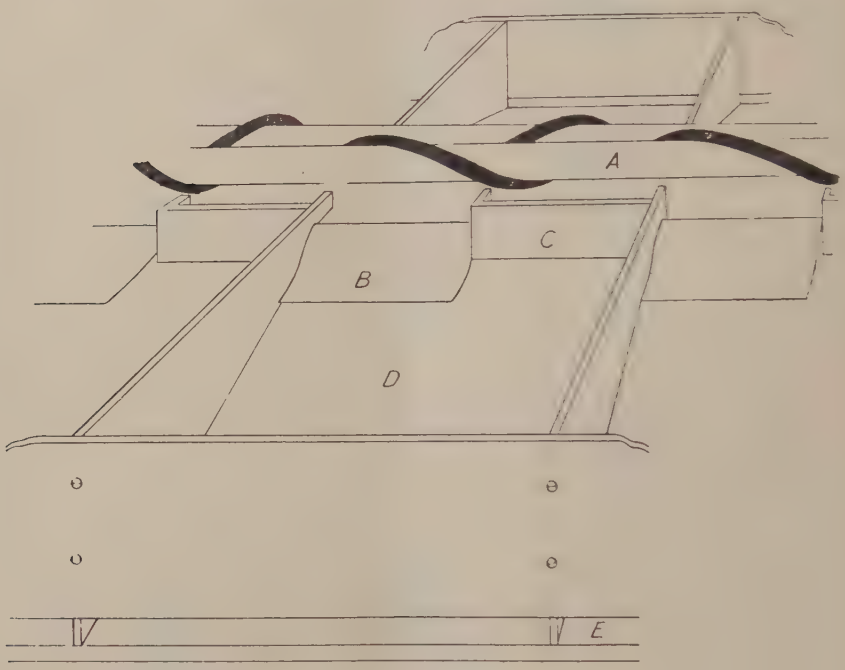


Plate 79.

MECHANICAL SIZING MACHINE FOR PASSION FRUIT SHOWING SIZING UNIT ONLY.

A. Sponge rubber-covered wooden rollers.
B. Two 6-inch by ½-inch boards on outside of rollers to prevent fruit from running off rollers.
C. Flywheel and handle.

When building the unit for greatest efficiency the rollers should be made adjustable. This is easily acomplished. One roller is fixed permanently; this should be the roller with the flywheel attached. The adjustable roller is bolted closely at the flywheel end, and is made adjustable at the opposite end by slotting the bearing mounting. This enables the space between the rollers to be adjusted by sliding the end of one roller closer or further away from the other as needed. (See E, Plate 78).



A. Section of sizing rollers.
B. Canvas flap to guide fruit into bin on near side of rollers.
C. Wooden back of canvas flap for guiding fruit into bin on far side of rollers.
D. Bottom of bin. This can be made by placing canvas or hessian over fine mesh wire.
E. Half-inch gap between side and bottom edge of bin. This enables the bins to be cleaned easily of all stalks and old leaves, &c.

Plate 80.

Section of bins on a double-sided machine, showing method of feeding fruit to each side of rollers.

Banana Packing Equipment.

In these days of knife shortages a useful dehanding knife can be made by attaching an old hack-saw blade to a wooden handle. This is done by attaching pieces of suitably shaped wood to each side of the blade, the whole being riveted together by using three flat-headed nails as rivets (Plate 81). The teeth of the saw are then ground off and the blade shaped and sharpened.

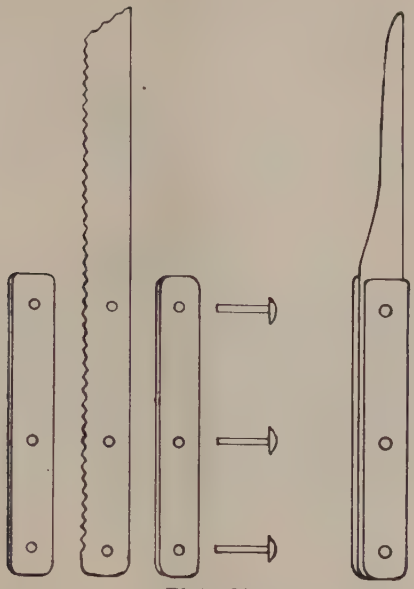


Plate 81.

HOME-MADE KNIFE WITH SHAPED BLADE.

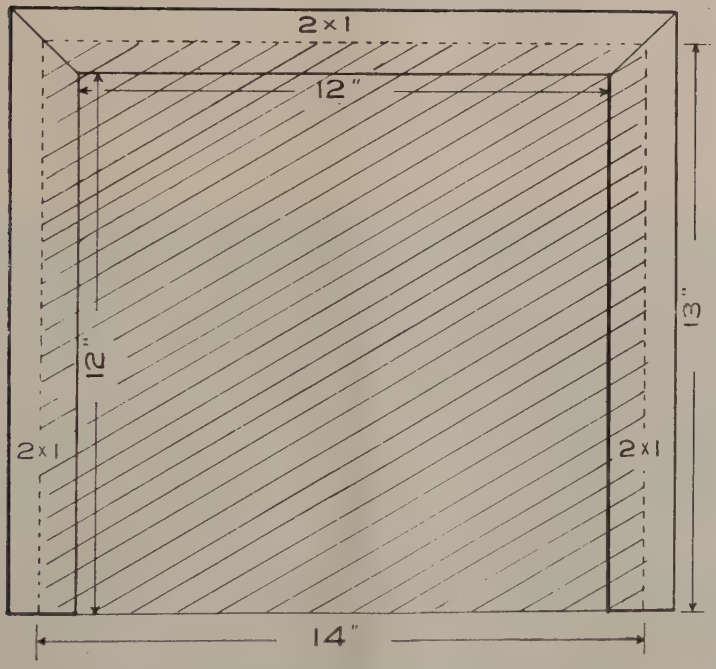


Plate 82.

NAIL CLINCHER AND TEMPLATE can be made separately or fitted to the case-making bench.—The dotted line enclosing the shaded portion shows the shape of the piece of sheet iron. Invaluable for joining two piece ends when making banana and other cases.

The materials required are—

2 pieces wood 2 inches x 1 inch, 14 inches long;
1 piece wood 2 inches x 1 inch, 16 inches long;
1 piece sheet iron 14 inches x 13 inches x $\frac{1}{8}$ inch;
and necessary nails.

Nail Clincher and Template.

For growers using the tropical fruit case, where a two-piece cleated end is usually provided, it will be found that much time will be saved by adding this small piece of equipment to the packing house. Ends will also be more easily made square, and, what is of utmost importance, will also be of the correct size. The attachment can be built on to the centre of the case-making bench, using one of the inside case end supports as one side of the template.

Where growers have to use two pieces of cleated timber for the ends of bushel cases, the same idea would be found advantageous, the dimensions of the piece of iron being altered to suit the type of case to be used.

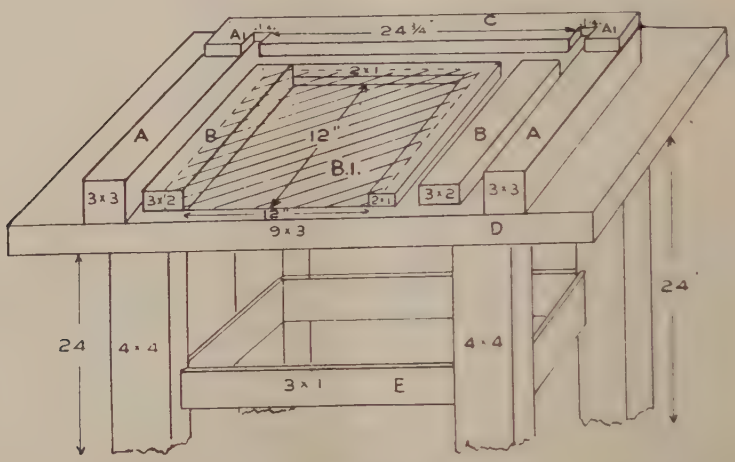


Plate 83.

BANANA CASE-MAKING BENCH, SHOWING METHOD OF ATTACHING CASE-END, TEMPLATE, AND NAIL CLINCHER.

Specifications.

Length:—42-50 inches;

Height:—(Underside of top), 24 inches;

Width:—24 inches;

Template:—As described (Plate 82).

Timber:—Legs, 4 inches x 4 inches;

Stops:—(A) Outside, 3 inches x 3 inches x 13½ inches;
(B) Inside, 3 inches x 2 inches x 12 inches;
(C) Back, 3 inches x 1 inch x 34 inches;

Top:—(D) 3 pieces 8 inches x 3 inches x desired length;

Stays:—(E) 3 inches x 1 inch.

Description.

The stops (A) and (B) are placed approximately 1½ inches apart, with the back stop (C) placed across the back ends of (A) and (B). A cut 1 inch deep and 1½ inches wide is made in the back stop to correspond with the slot between (A) and (B). The back end of this cut should be 12 inches from the front of the bench. The inside stop (B) is placed ½ inch from the front edge.

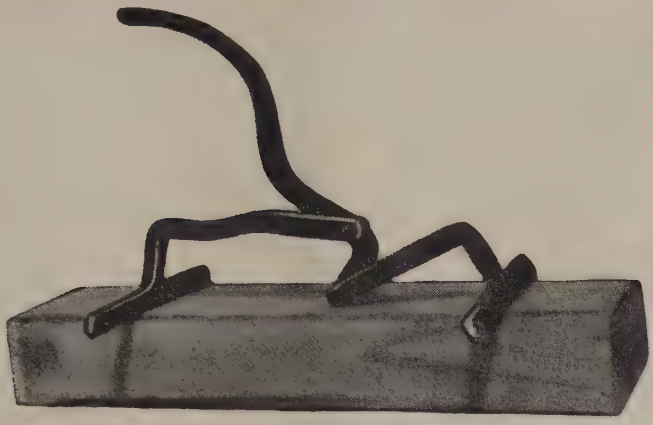


Plate 84.
AN IRON NAILING DOWN CLAMP, CAN BE MADE FOR A FEW SHILLINGS BY ANY BLACKSMITH.

Plate 85.
USING THE CLAMP. CLAMP IN POSITION BEFORE APPLYING PRESSURE.

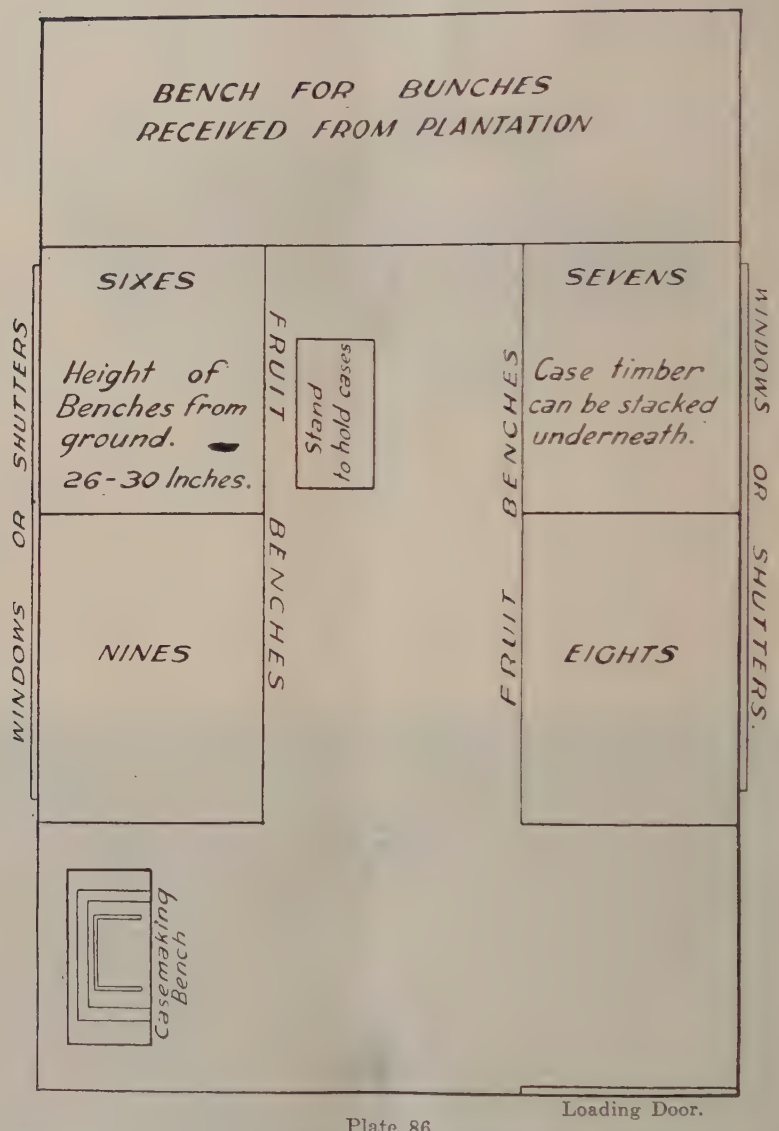


Plate 86.

SUGGESTED LAYOUT OF A BANANA PACKING SHED.—Many banana growers would ease and greatly increase the speed of their work if they designed a convenient layout for their packing shed.

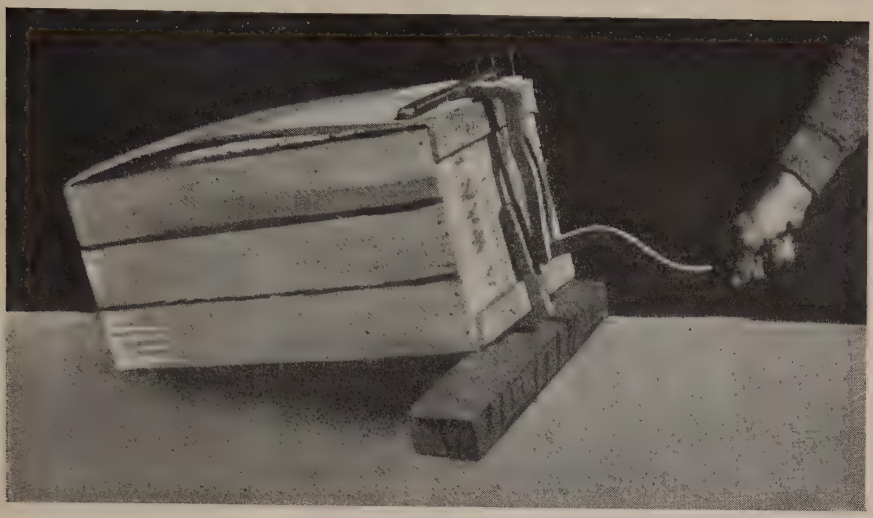


Plate 87.
Pressure Applied to Lid Showing Lid in Position Ready for Nailing.

Plate 88.
Another Type of Iron Clamp Showing Clamp Ready to Apply the Pressure to the Lid.

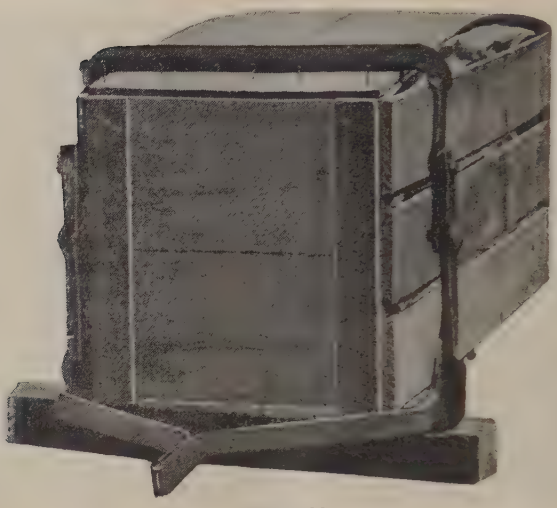


Plate 89.
PRESSURE APPLIED. LID READY FOR NAILING.

NAILING-DOWN CLAMPS OR LIDDING PRESSES.

There are many types of nailing-down clamps, mostly home-made, but none the less effective. Those illustrated (Plates 84 to 94) can easily be made at home or by the local blacksmith. A study of the illustrations will show the designs. The jaws when shut should be approximately

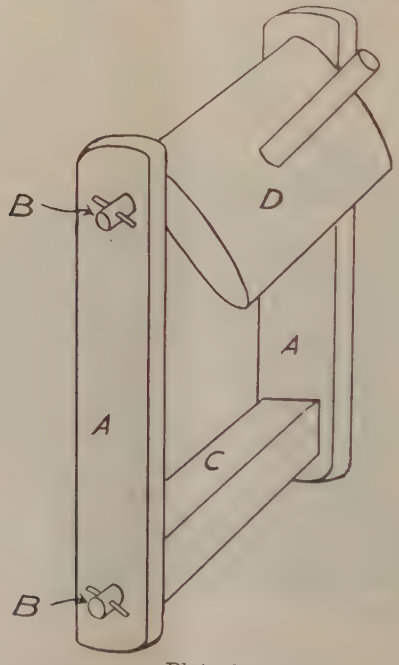


Plate 90.
HOME-MADE WOODEN CASE LIDDING PRESS.

12½ inches apart (Plates 85 to 89). A simple clamp made of timber also works quite satisfactorily (Plate 90).

This press is easy to make and simple to use. The following timber is needed:—

2 pieces 4 inches by 2 inches by approximately 28 inches long for side pieces;

1 piece 3 inches by 3 inches by 13½ inches long for base block;

1 piece 8 inches by 1½ inches by 13½ inches long for pressure unit;

1 piece broom handle 12 inches long for handle of pressure unit;

4 pivots (pieces of broom handle) for pressure unit and base block;

4 pegs or pins to place on the outside of side pieces.

The side pieces (A) are drilled to take the broom handle pivots (B), which are placed in the ends of the base block (C) and pressure unit (D). The holes should be drilled so as to permit the bottom of the pressure unit and the top of the base block to be 12½ inches apart (see Plate 92).

The pressure unit is made by taking the 8 inch by 1½ inch by 13½ inch piece of timber and rounding one edge. This is the bottom edge which comes in contact with the box lid while pressing. The board is drilled at the opposite edge to take the pivots, one being inserted at either end about 1½ inches from the top edge. The lever is inserted in the middle of the board 3½ inches from the top edge.

The base block of 3 inches by 3 inches timber is made by inserting two pivots into the ends. The pivots should be approximately 6 inches long, and be inserted at least 2 inches into the pressure unit and base block.

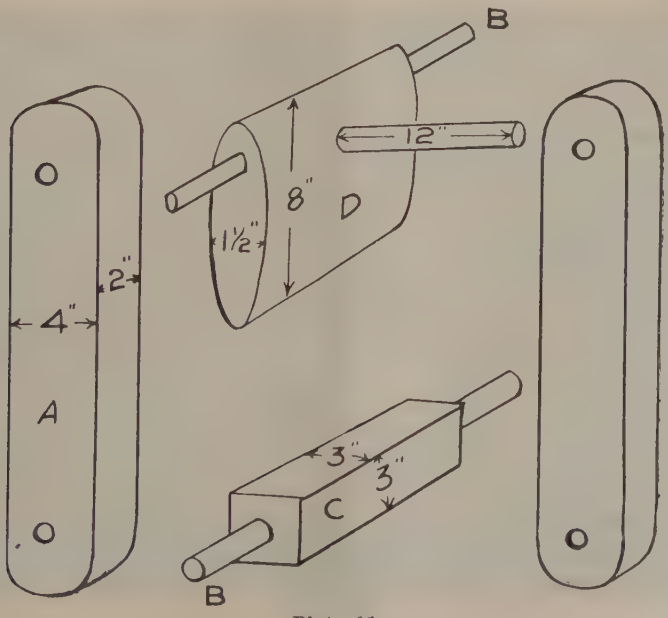


Plate 91.

The Lidding Press before Assembly.

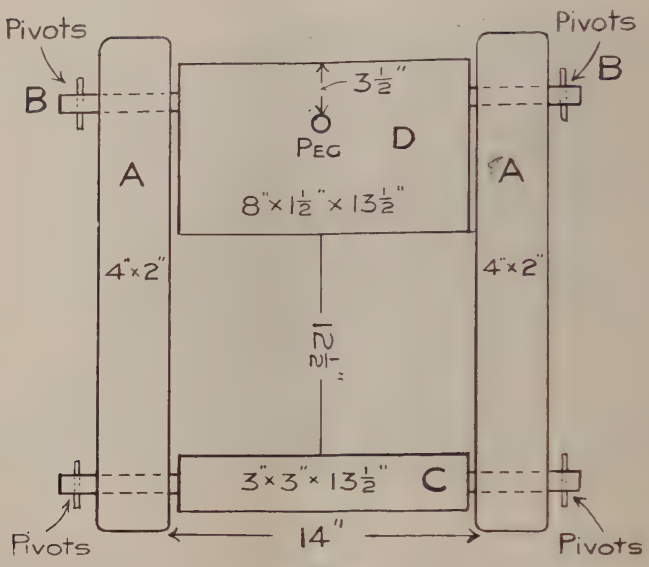


Plate 92.
FRONT VIEW OF ASSEMBLED LIDDING PRESS.

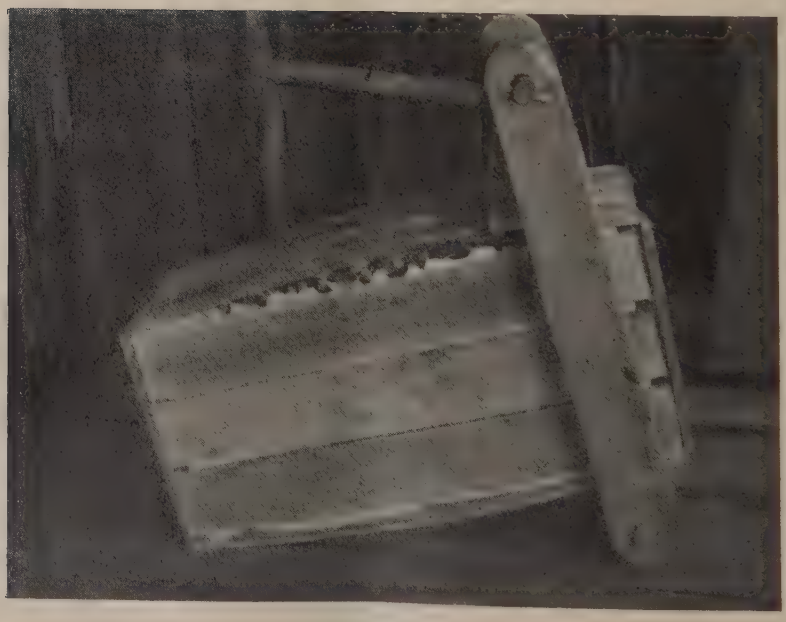


Plate 93.
WOODEN LIDDING PRESS BEFORE APPLYING PRESSURE TO LID.

Plate 94.
Wooden Lidding Press with Pressure Applied.

A Handy Picking Tray Holder for Strawberry Growers.

For the small farm the picking tray holder unit illustrated will be found most useful. Easy to make, it will pay for itself many times over.

Whilst the tools and gadgets illustrated are excellent in operation, growers are advised that it is not intended to suggest that they should replace commercial tools when these are more readily available.

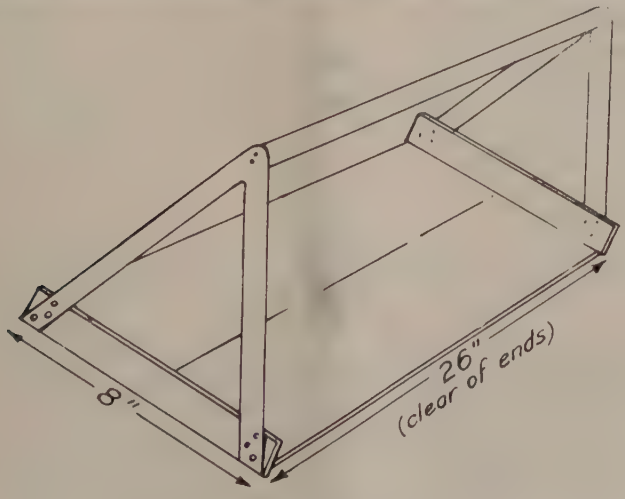


Plate 95.

Ends: 2 pieces 8 inches x 2 inches x ½ inch.
Bottom: 2 pieces 27 inches x 4 inches x ¼ inch (minimum).
Handle: 27 inches. Length of broom handle with suitable supports to suit picker.

Vegetable Production

Vegetable Seed Contracts.

The Department of Agriculture and Stock has been advised by the Commonwealth Vegetable Seeds Committee that it desires to arrange contracts with producers in Queensland for the production of certain acreages of vegetable seeds. The varieties, acreages required, and the price payable for seed, are shown in the following table. Growers who are interested and wish to make a contract, are asked to communicate with the Under Secretary, Department of Agriculture and Stock, Brisbane, without delay.

Variety.	Acres.	Price.
BEANS (FRENCH)—		Bushel.
Brown Beauty	79	80s.
Canadian Wonder	18	80s.
Epicure	15	80s.
Feltham Prolific	15	80s.
CORN (SWEET)—		
Country Gentleman	10	25s.
Golden Bantam	3	25s.
Golden Sunshine	25	25s.
Hybrid	93	50s.
CUCUMBER—		Lb.
Early Fortune	5	6s.
Kirby's Staygreen	2	6s.
MELON (ROCK)—		
Powdered Mildew Resistant No. 45	5	7s. 6d.
MELON (WATER)—		
Hawkesbury Wilt Resistant	1	6s.
PUMPKIN—		
Queensland Blue	51	6s.
Triamble	26	7s. 6d.

WATER MEASUREMENTS

One gallon = 277 cubic inches = 10 lb.

One pint (fresh) = 1¼ lb. (approx.).

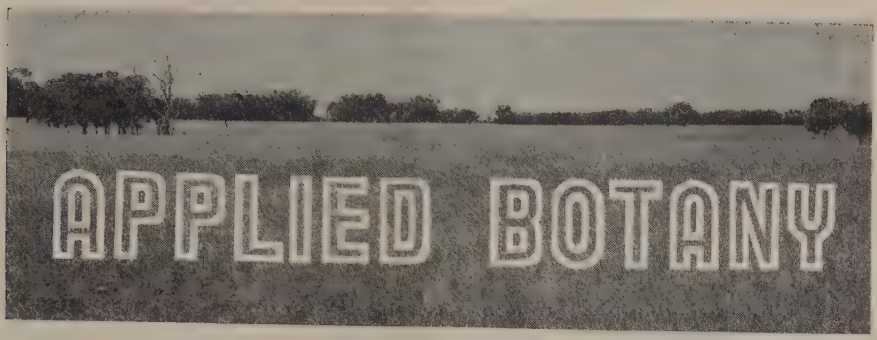
6¼ gallons = 1 cubic foot = 1,000 ounces.

1 cubic foot = 62½ lb.

11 gallons = 1 cwt.

224 gallons = 1 ton.

The United States gallon = .883 Imperial gallon.



Gomphrena Weed.*

C. T. WHITE, Government Botanist.

DURING the past summer a great number of specimens of Gomphrena Weed have been received from pastoralists and farmers for identification and report. Many have feared that it might become a very serious pest in the same way as the Khaki Weed, to which it is closely allied. So far as observed, however, the plant does not seem to be very difficult of eradication and has not proved particularly aggressive.

It belongs to a wholesome family (Amarantaceae) but does not seem to be eaten by stock to any extent, though one or two reports have been received from the country to the effect that once stock acquire a taste for it they eat it readily enough. It is not known to possess any poisonous or harmful properties. It is a native of tropical America and first made its appearance about Townsville some fifteen years ago. Since then it has spread along the whole of the coastal belt and quite some distance inland. In the more inland localities it seems to favour a sandy soil.

To enable farmers and pastoralists to identify it the plant may be described as an erect, much-branched annual herb mostly about one foot to eighteen inches high with a fairly stout taproot and often rooting at the lowermost nodes. Sometimes the stems lie flat on the ground, especially when eaten or trampled down by stock. The flowers are white, borne at first in round heads about half an inch across, which as they grow older lengthen in seed to spikes about two inches long. The seeds are borne in great abundance, are dark chestnut brown, smooth and rather shiny.

* *Gomphrena decumbens.*

ANSWERS.

(Selected from the Government Botanist's outward mail.)

Johnson Grass.

R.H. (Murphy's Creek)—

The specimen is the Johnson grass (*Sorghum halepense*), widely spread as a weed over most warm countries. It is very frequently found in cultivations in parts of Queensland and is very difficult to eradicate because every small piece of the underground portion cut with a spade or plough is capable of forming a new plant. If there is only a small patch it would be advisable to eradicate it carefully and kill the underground parts by exposure to the sun.

The grass is quite a good fodder, but like most of the Sorghum family contains a prussic acid yielding glucoside; therefore, care must be exercised in feeding it to stock. The safest thing to do is to cut it when in seed head and allow it to wilt a little time before feeding. Hungry cattle should not be allowed to gorge themselves on it. Provided these reasonable precautions are taken the plant is quite safe.

Plate 96.
GOMPHRENA WEED.

PLANT PROTECTION

Ladybird Beetles.

J. HAROLD SMITH, Senior Research Officer.

AMONG the useful insects on the farm and in the orchard, none are better known than the ladybird beetles or Coccinellids which occur on plants infested by scale insects, aphids, or mealy bugs. They are relatively small, round to oval beetles with the head fitting snugly to the rest of the body. The largest does not exceed three-eighths of an inch in length and the smallest is little more than the size of a pin head. Some are steely-blue in colour, others are brown or black with a regular colour pattern of red or yellow spots. The better-known species, however, are yellow with black spots, blotches, or stripes on the wing covers.

Australia has more than 250 different species of ladybird beetles. The richness of the fauna may be due to the ample food supplied to the beetles by the numerous indigenous scale and lerp insects occurring on native trees, shrubs, herbaceous plants, and grasses. Few ladybirds feed on only a single species of insect, and it is not surprising, therefore, that scale insect, mealy bug, and aphid colonies on cultivated fruit trees and farm crops have invariably one or more of these useful predators associated with them. Though best known as enemies of scale insects, mealy bugs and aphids, some ladybirds prefer the minute white flies and lerp insects seen on cultivated and native plants, while a few subsist almost entirely on fungi (Plate 97).

Plate 97.

A Fungus Eating Ladybird (*Halyzia galbula* Muls.).

Fig. 1.—Adult beetle x 5.
Fig. 2.—Larva x 5.
Fig. 3.—Pupa x 5. [*Drawings by William Manley.*

LIFE HISTORY AND HABITS.

The life history of the spotted ladybird* is more or less typical of all these beetles. This yellow insect (Plate 98; fig. 1) is about one-third of an inch long and has four transverse rows of black spots on the wing covers. It feeds on many species of aphids, but is, perhaps, most common during the spring and summer months on deciduous fruit trees, such as

* *Harmonia conformis* Boisd.

the apple, which frequently carry large populations of the woolly apple aphid. The bright-yellow, elongate-oval eggs are laid on end in clusters of thirty or thereabouts in and among aphid colonies on the plant. After three to six days, these eggs hatch and from them emerge minute, smoky-black larvæ which immediately begin to feed on the aphids. These may be consumed whole or simply torn apart and sucked dry, the mode of attack depending on the age of the aphid and the capacity of the larva to eat the harder parts of the host's body. As the larva moults and grows, a broad, yellow band appears on the abdomen, the surface of which acquires a somewhat warty appearance. During the larval stage 200 to 500 aphids may be destroyed. About two weeks after emerging from the egg the larva, then about one-half of an inch long and full-grown, seeks a sheltered spot on the stem or leaf of the plant and attaches itself to the surface just before pupating. This change to a quiescent, non-feeding stage takes place in a head-downward position, the shape of the pupa being more round than that of the larva but less round than that of the adult beetle. Four to six days later the adult beetle escapes from the pupa through a large T-shaped split in the skin. Like the larva, the beetle feeds on the aphids continually during its life of four to six weeks and is probably equally important in their destruction.

Plate 98.

LADYBIRD BEETLES PREDATORY ON APHIDS.

Fig. 1.—The spotted ladybird (*Harmonia conformis* Boisd.) x 5.
Fig. 2.—The striped ladybird (*Verania frenata* Er.) x 5.
Fig. 3.—*Coelophora inequalis* Fab. x 5. [*Drawings by William Manley.*

The foregoing account of the life history of the spotted ladybird applies to most aphid-feeding species but differs in some details from the habits of those which feed on other insects. Ladybird beetles which attack scale insects and mealy bugs may lay their eggs singly, and these are white or orange in colour and less elongate in shape than in the aphid-feeding species. The larvæ also vary a great deal. Most of the aphid and hard-scale feeding larvæ are similar in appearance to those of the spotted ladybird described above—i.e., smoky-black in colour with yellow markings. Those of species which attack mealy bugs or fluted scales may be clothed with a mealy covering supplemented by an ornate arrangement of white wax filaments or plates which give them a superficial resemblance to the insects on which they feed. A few do not pupate on the plants but seek shelter under trash at ground level; others come together in the later larval stages and pupate in large colonies on the trunks of trees or on the ground.

One curious feature of some ladybird beetles, exemplified by certain Queensland species, is the tendency of the adults to congregate in large

numbers. One species, the striped ladybird* (Plate 98; fig. 2) a small yellow insect with a black, dumbbell-shaped marking on each wing cover, feeds on aphids in the axils of maize, sorghum, and sugar-cane during the summer months. During autumn, winter, and spring adults occur in millions, sometimes clustered on a single tree in an orchard, sometimes thickly dispersed over an acre or so of herbage. These swarms are occasionally so dense that the plants on which they rest assume a drooping appearance. Ladybird beetles when behaving in this way consume little, if any, food, though they do sometimes enter flowers and cause premature petal-fall. Such swarms may occur almost anywhere—on inhospitable sand dunes, in timbered areas, and even in the suburbs of a city without any obvious proximity to agricultural areas where they might have been active during the summer months. The phenomenon is apparently an expression of hiberating tendencies stimulated by impulses about which little is known.

THE VALUE OF LADYBIRD BEETLES.

Like most predators, ladybird beetles breed more slowly than the insects on which they feed, and seldom appear in numbers until large populations of scale insects, mealy bugs or aphids are already on, and damaging, crops. Over a period of three or four weeks, however, the position may change considerably as the predator becomes sufficiently numerous, first to check the pest, and, later, to reduce its numbers to levels at which it is of little or no importance to the farmer. There is thus a constant fluctuation in the populations of pest and predator—first one is dominant and then the other. The frequent time lag before the ladybird beetles become numerous enough to check the pest is also due, in part, to the activity of some small wasps and flies which parasitize the egg, larval or pupal stages of the ladybird itself and slow down its normal rate of increase. Nevertheless, in spite of these handicaps, ladybird beetles invariably curb the activities of the insects on which they feed, though they limit the scope, rather than prevent the occurrence, of pest outbreaks.

1 2 3

Plate 99.

PREDATORY LADYBIRD BEETLES.

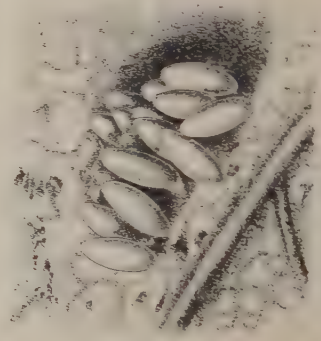
Fig. 1.—*Rodolia cardinalis* Muls. x 5; predatory on cottony cushion scale.
Fig. 2.—*Cryptolaemus montrouzieri* Muls. x 5; predatory on mealy bugs.
Fig. 3.—*Rhizobius ventralis* Er. x. 5; predatory on hard scales.
[*Drawings by William Manley.*

Ladybird beetles seldom receive due credit for the good work they do, though their value is well illustrated by the fact that some pests of quite minor importance in Australia have, when inadvertently introduced to other countries, threatened the extinction of established agricul-

* *Verania frenata* Fab.

tural industries until their ladybird associates were also introduced to exercise control. It is not surprising, therefore, that overseas entomologists concerned with finding ways and means of keeping pests in check have given a great deal of attention to ladybird beetles in this country. Several species have been collected from time to time, shipped to other countries, and released in areas where the insects on which they feed are injurious to crops. Directly or indirectly, such importations have been so widespread that one or more Australian ladybird beetles are now established in most tropical and sub-tropical countries. The three best known of these are the Icerya ladybird,* a very small black and red species (Plate 99; fig. 1) which feeds on the cottony cushion scale, the mealy bug ladybird,† a blue beetle with red-tipped wings and head (Plate 99; fig. 2) which destroys mealy bugs, and the small dark-brown Rhizobius ladybird‡ (Plate 99; fig. 3 which attacks some hard-shelled scales on forest trees.

1



2

3

4

Plate 100.

THE LEAF-EATING LADYBIRD (*Epilachna 28-punctata* Fab.).

Fig. 1.—Adult beetle x 5.
Fig. 2.—Egg mass x 5.
Fig. 3.—Larva x 5.
Fig. 4.—Pupa x 5.

[*Drawings by William Manley.*

PLANT-FEEDING LADYBIRD BEETLES.

Curiously enough, one of the better-known ladybird beetles, the leaf-eating ladybird,‖ is not predatory on other insects; it is, in fact, a serious pest of pumpkins, melons, cucumbers, and similar crops. Occasionally,

* *Rodolia cardinalis* Muls.

† *Cryptolaemus montrouzieri* Muls.

‡ *Rhizobius ventralis* Erich.

‖ *Epilachna 28-punctata* Fab.

too, it attacks potatoes, tomatoes, and a few related weeds. There is frequently some confusion between this insect and the spotted ladybird which attacks aphids and is a useful predator. Both have much the same general appearance and colour, but the leaf-eating ladybird can be distinguished from all other species by the twenty-eight black spots on the wing covers (Plate 100; fig. 1). The spotted ladybird has approximately eighteen and the larvæ of the two insects are quite different. Those of the leaf-eating ladybird are sluggish in habit, and their yellow bodies bear a considerable number of dark-coloured, branched spines (Plate 100; fig. 3); those of the spotted ladybird are, as described earlier, smoky-black in colour and very active.

SEED INOCULATION OF LUCERNE AND OTHER LEGUMES.

During the autumn months many farmers will be sowing land to leguminous plants such as lucerne, lupins, clovers, field peas, and vetches. It is desirable that seeds of these plants be treated with special bacterial cultures in order to ensure that the bacteria necessary for the best development of the plants are present in the soil.

The bacteria required by plants of the legume family occur in healthy, vigorous plants in root swellings known as nodules. Within the nodules the bacteria absorb nitrogen from the air in the soil and convert it into a form of nitrogen which can be used by the plant for growth. Plants other than legumes, and legumes from which the nodule bacteria are absent, must obtain their nitrogen from nitrogen-containing substances in the soil, and often these are not plentiful. The presence of the appropriate bacteria therefore gives leguminous plants a decided advantage over other plants, and this advantage is lost when the bacteria are absent from the soil.

In all cases where new land is being sown to a leguminous plant—lucerne, lupin, clover, vetch, field pea, cowpea, soybean, &c.—it is highly desirable that only inoculated seed be sown. Further, even if the land has borne a fairly good crop of the same or another legume there is no reason to assume that the most efficient type of bacteria is already present in the soil. Consequently, inoculation of seed with proven efficient bacteria is usually well worth while whenever leguminous crops are to be sown.

The Department of Agriculture and Stock prepares bacterial cultures suitable for all legumes commonly planted in Queensland. These are available at a charge of one shilling per bottle. The material in a bottle is sufficient to treat up to 60 lb. of large seeds, such as cowpeas, or 30 lb. of smaller seeds, such as lucerne. Briefly, the inoculation process consists of sprinkling the seeds with skim milk to which the bacterial slime in the bottle has been added. The seed is allowed to dry and is then sown in the usual manner.

Farmers requiring cultures should write about a fortnight before the expected planting date, indicating the variety and amount of seed to be treated.

—T. McK.

Fat Lamb and the Food Problem.

THIS is an appeal to Queensland fat lamb producers to produce more lambs and better lambs. There are three main ways in which this very desirable increase may be brought about. The first, of course, applies to numbers. More ewes should be mated, and this demands, secondly, an increase in suitable cultivation for the purpose. Thirdly, in the special circumstances of war now prevailing, lambs should be held longer than usual, with the object of increasing the individual weights by at least 10 lb. It is estimated that growers who usually turn off lambs at 12 to 13 weeks old may achieve this object by holding the lambs for another month. It is important that not only should the weight be increased, but also that condition should be maintained. Growers may rest assured that the price paid for the heavier lamb desired will not be reduced on the per lb. basis, provided always that the lambs are truly fat.

Everything on the land eventually comes to a matter of pounds, shillings, and pence, and where could a quicker or better return be looked for in the sheep industry? The ceiling price, which all should strive for, is adequate for the grower, while within the capacity of the consumer to pay for first quality meat.

Cultivation may be regarded as essential in fat lamb raising. First class lambs have been produced on grass lands during favourable seasons, but as an exception and not as a rule, and disappointments have been so many that growers are advised to abandon the idea of production without cultivation.

Cereals as Sheep Feed.

All the cereals make first-class feed for ewes and lambs. If seasonal conditions are favourable, the grower may harvest a crop, too, in addition to feeding his flock. Care should be taken, however, not to put stock on to cereal crops until the plants are firm in the soil, if a harvest is desired. Some of the dwarf sorghums are fast gaining in favour as a feed for ewes and lambs. The carrying capacity of these sorghums is very great and, sown in conjunction with cereals and with the right date spacing, provide succulent feed for practically throughout the year. Lucerne, an excellent fodder for ewes and lambs, should be used to a much greater extent than it is. The establishment of a lucerne crop is admittedly costly, but after the initial expense the crop will last for years with anything like ordinary care.

The Foundation Flock.

As the sheep population of Queensland consists of 98 per cent. of the Merino breed, the Merino will be discussed first in respect of fat-lamb raising in this State. It is a mistake to think that any Merino ewe will do. Care should be taken in the selection of the largest framed, boldest, best constitutioned ewes obtainable. The sheep should be as free from wrinkles as possible. Ewes neither too young nor too old are best, for four and six tooth ewes still have all their strength and vitality, under ordinary conditions. With these ewes should be joined either the Border Leicester or the Romney Marsh rams. This advice may at first thought be regarded as reactionary, but it should be remembered that Merino ewes are the subject of present discussion.

Under ordinary conditions, the grower is advised to save the best of the ewe lambs from the resultant drop as the foundation of the fat-lamb producing flock proper. The object of this advice is to breed into a crossbred ewe flock as speedily as possible. Having established this crossbred flock and with fat-lamb production in view, the procedure with regard to the choice of rams naturally alters. On the long-woolled crossbred flock, growers are advised to use one of the Downs type of English ram. In Queensland, the greatest success has been gained with the South Down and the Dorset Horn. Healthy rivalry exists between exponents of these two breeds, but the advice to producers in the choice of either is to be governed by circumstances, such as locality, country, feed crops grown, the period selected as most suitable for lambing and other relevant circumstances. The South Down cross lamb is deservedly popular in the overseas trade. The Dorset Horn cross, too, has been very successful under Queensland conditions. Both breeds mature very early, a necessary qualification in this trade. Possibly, more success may be achieved with the use of the Dorset Horn in respect of lambing percentages. Of all the English breeds, the Dorset Horn alone will, like the Merino, mate at any period of the year. This is not to say that, even with the Dorset Horn, the extremely hot weather should not be avoided.

The difference in a crop of lambs got by pure-bred sires is most marked when compared with lambs sired by indifferent members of the breed. Only rams from registered studs should be used. It pays to use the best. The cost of better rams is always compensated by the enhanced price for the product.

The Corriedale.

The Corriedale, it is pleasing to relate, is fast improving in type in this State. When first introduced here, the tendency with breeders was to produce too fine a sheep. The breed was evolved as a dual purpose sheep by the joining of the Merino and the Lincoln, and the careful selection of sheep for mating within the breed. The pure-bred Corriedale ewe is one of the best of mothers for the production of fat lambs when joined with the Downs rams. She is docile and quiet and an excellent milker—making for early maturity in her lamb. Growers are advised to give more attention to this breed as part of the programme in the production of more and better lambs. This advice applies especially to holders of the rich brigalow and belah country, on the fringe of the Darling Downs, and other regions where that class of country is situated. It is on these areas of country that the greatest expansion in fat-lamb production is looked for. The preparation of

brigalow and belah country for cultivation is admittedly costly, but in view of the average price at which the land may be acquired it is thought that the necessary expenditure is well within the bounds of economy. In any case, the land has to be improved.

When breeding from a crossbred flock, bred as previously indicated from one of the longwools, it is recommended, with a view to maintaining the flock at a high standard, to join a few rams of the long-woolled type with the Downs breeds chosen with the idea of retaining the ewe lambs dropped as additions and replacements in the ewe flock. This is an important point, for suitable crossbred ewes are difficult to buy at a price satisfactory to the grower.

The Lamb Producing Flock.

The care and attention given the lamb producing flock calls for remark. Before lambing, it is not necessary or desirable to have the flock too fat. At joining time over-fatness is a distinct disadvantage, for ewes in this condition are shy breeders, and heavy lambing percentages should always be looked for in the industry. Too much condition applies especially as disadvantageous when crossbred ewes are grazed. The condition desired at joining and previous to lambing may be described as improving to strong store condition.

After lambing, no feed can be too good for the ewes and lambs. Ewes, then, before lambing may be grazed on any feed sufficiently good to maintain the condition described. This procedure saves, to no small extent, the cultivated crops prepared for the ewes and lambs. Once lambs are at foot the grower should do all he can to maintain the ewes at full flush. Apart from the increased weight aimed at, lambs properly finished travel much better, and present that bloom at the yards so appreciated by the buyer. Lambs should never be allowed to receive a check. If a paddock shows signs of depletion the flock should be immediately put on to fresh pastures.

Lamb Marking.

As distinct from the practice with the ordinary flock, lamb marking should be done when the lamb is younger. With comparatively small numbers, it is no hardship to treat the lambs in small lots. This, of course, is out of the question when the numbers are large, as in ordinary lamb marking where a muster has to be undertaken and other preparations made for the work. The best time at which to mark lambs intended for the fat-lamb trade is when they are a fortnight old. The loss of blood at this stage is very nearly negligible and recovery from the shock of the operation is rapid.

Old yards should not be used if there is any risk of infection in them. Instruments and knives should be carefully disinfected. Lambs should be returned to their mothers as soon as possible. Fat lambs, of course, should never be weaned. An axiom in the trade is straight from the teat to the block.

Marketing.

There are certain points in the marketing of lambs which, if attended to, would make for the improvement in returns to the grower, and saving in rejections. For the time being producers are urged, as previously stated, to hold their lambs in prime condition until they will dress to about 40 lb. A mistake is sometimes made in getting the whole

drop away together. This is obviously wrong. Even the duration of the lambing period points to this. Lambs should be marketed as they become fit and will go the desired weights. The extra trouble is admitted, but higher returns more than compensate for it.

It should always be remembered that fat lambs are very tender and bruise easily. They should never be prodded with sticks during trucking. A lamb should never be lifted in the race or elsewhere by the wool. Rough dogs should not be used. Lambs should not be overdriven, nor trucked when in a heated condition. Trucks should not be overloaded. All this advice applies to details, but if adopted the lambs will be delivered at the sale yard in the "bloom," a condition so much to be desired and so important in respect of the gaining of full market rates.

The need for more lambs, better lambs, and heavier lambs is so urgent and it is confidently believed that flock owners concerned will respond to the best of their ability and opportunity and the facilities available to them to the call for an increased production.

SHEEP BRANDING AND FLEECE INJURY.

In Queensland, the use of tar and pitch as a sheep-branding material is prohibited. Both are injurious to wool, as neither scours out; and, further, both cause loss in the process of scouring. In the scour, clean wools should not follow wools which have contained tar or tar derivatives.

To be entirely successful, a branding mixture should fulfil two requirements—(1) the brand should be legible for the greater period of the fleece's growth at least; and, (2), the material used for branding should scour out without injury to the wool, or without affecting the scour liquor.

A mixture which has given reasonable satisfaction on both counts, is as follows:—

Wool fat	30 parts
Resin	29 „
Carnauba wax	3 „
Kieselguhr	18 „
Ignited iron oxide	6 „

Emco spirits to desired consistency.

Carnauba wax is vegetable, and is coloured yellow, cream, or white.
Kieselguhr is a diatomaceous earth.

Ignited iron oxide is red ochre of ferric oxide.

Emco spirit is the trade name of the material purchased as such.

—J. L. HODGE.

GADGETS AND WRINKLES

PULLING OUT TREES.

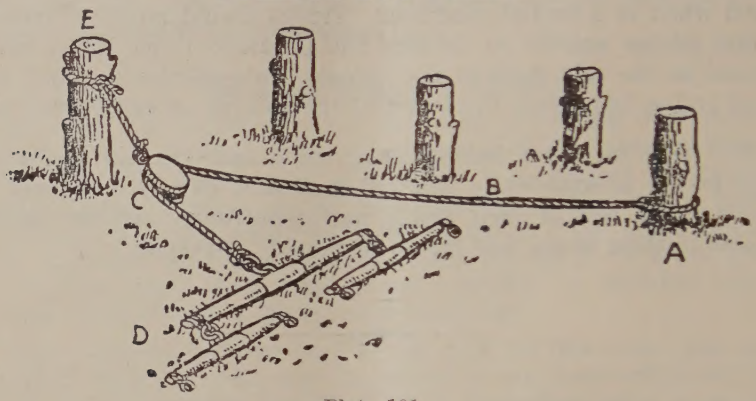


Plate 101.

Only stumps are shown in the illustration, but trees of limited sizes can be dealt with in a similar way. It may be advisable to use wire ropes, and the team of horses used should be steady pullers. Alternatively, a tractor may be used. A short rope or chain, with a single pulley (*c*) is attached to the tree to be removed (*e*). The anchor rope (*b*), which runs through the pulley, is fastened to the bottom of a stout tree or stump. Always pull towards the anchor tree.

LAND LEVELLING FOR EROSION CONTROL.

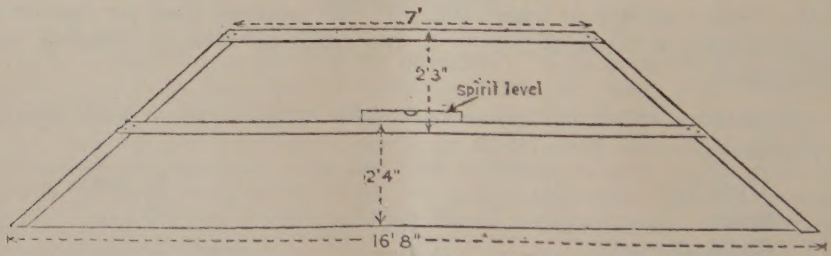
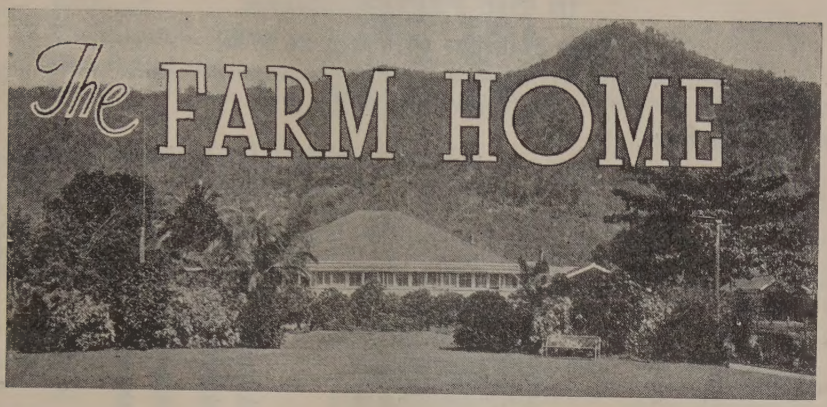


Plate 102.

A levelling device, such as depicted, is very convenient for laying out contours for soil erosion control. Two men are needed to operate it. One carries the frame with the centre of the upper arm on his shoulder. The other drives in pegs. When laying out a true contour the frame is used as shown, but if a fall is to be given to line, a movable foot is bolted or screwed on to one leg. In this way, one leg is made longer than the other by correct fall of distance between the two arms. Thus, if a fall of 1 in 100 is required, and the spread between the feet is 200 in., then the leg to which it is attached is 2 in. lower than the other. With the frame, two men can peg out 6 miles of contour banks in a day. The frame can be made of light straight oregon or red pine of 4 in. by 1½ in. Three pieces 8 ft. long and one of 12 ft. 6 in. are required. A carpenter's level is mounted on the cross-baton. In screwing the frame together, see that the distance between the base of the two legs is correct.



Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

EXAMPLE AND THE CHILDREN.

TWO ideas came uppermost recently when watching the behaviour of some high school children in a tram. The first was the old adage, "Example is better than precept," and the other was a concluding remark in a public lecture by a medical psychologist which I heard some years ago, "If you see a very nicely behaved child, you may be fairly sure he has very nice parents."

Good manners and courtesy are the oil on the gears of life. Mothers and fathers will realise how much they themselves appreciate courtesy from business people and others with whom they have dealings. Why, then, should they not make every effort to instil into their children the grace of good manners, and for the most part we must realise that good or bad manners are learnt in the home.

Is it to be supposed that there is no association between a small boy's cheeky answer to his mother when she asks him to do a job for her in the afternoon and his father's early morning display of rudeness to that same mother, because he was late for the office and the newspaper had not come? Children are great imitators, and after all they can only copy what they see. If their parents are rude or ungracious to their children and each other, how can it be expected that the children will develop good manners and courteous behaviour?

Parents should be impressed with the need for showing a good example in all sorts of ways, and manners in particular. There seems to be a feeling that good manners are rather "sissy," while in point of fact the lack of them is probably a sign of a certain juvenile quality in our national development and outlook, considering that the older and more developed civilisations consider the cultivating of good manners part of young people's general education. Even from the standpoint of economics, the well-mannered boy or girl has a much better chance of material advancement than the rude or uncouth type, because he impresses his employers more favourably.

So, in spite of the rush of every-day life these days, it is necessary to impress upon parents the need for giving serious consideration to the type of example they are setting the young children whose future behaviour patterns are now being formed in the home. If they try to practise just the little courtesy of accompanying requests to the children and each other by the "please" and "thank you" and "excuse me" which they are willing enough to grant to outsiders they will be placing a foundation for future character formation and mental development which ranks in importance with the food they give their children and the fresh air and sunshine their physical health demands.

Questions on this or any other matter concerning Maternal and Child Welfare will be answered by communicating personally with the *Maternal and Child Welfare Information Bureau*, 184 *St. Paul's Terrace, Brisbane*, or by addressing letters "*Baby Clinic, Brisbane.*". These letters need not be stamped.

IN THE FARM KITCHEN.

The Makings of a Square Meal.

In present circumstances, recommendations are subject, of course, to the availability of the ingredients mentioned or of suitable substitutes.

A Vegetable Broth.

Take 1 lb. gravy beef, ½ lb. beef or veal bones, 1 small turnip, 2½ pints cold water, 1 large onion, 1 carrot, 1 clove, salt, and pepper to taste.

Cut the beef into small pieces and place it with the broken bones in a saucepan. Add the water. Stand aside for one hour, then bring slowly to boiling point. Skim and simmer gently for two hours, and strain. Add peeled and chopped onion, carrot, turnip, clove, bay leaf, and seasoning to taste. Cover and simmer till vegetables are tender.

Gravy Soup.

Take 1½ lb. shin of beef, 1 carrot, 1 medium onion, 1 stalk celery, 1 tablespoonful cornflour, 1½ quarts of water, ½ turnip, 1 oz. butter, pepper and sale to taste, 3 tablespoonfuls water.

Wipe the meat and cut into dice, then place in a saucepan. Pour over the water. Cover and bring to the boil and allow to simmer gently. Fry the sliced carrot, turnip, and celery in the butter (or dripping) till brown, then add to the soup. Put in the bay leaves. Simmer for three hours, then rub through a sieve. Dissolve the cornflour in three tablespoonfuls of water and stir into the soup. Boil four minutes, stirring constantly. Season to taste and serve.

Sausage and Egg Pie.

Bring 1 lb. pork sausages to boil and simmer very gently until they feel quite firm. Allow to cool, then remove skin and cut into dice. In the meantime boil 4 or 5 eggs until hard and cut them into slices. Melt 1 tablespoon butter in a saucepan, add 1 tablespoon flour, cook a little, then add 2 cups milk or white stock. Stir over gas until thickens, then add 1 dessertspoon grated onion. 1 tablespoon each tomato sauce and shredded and fried bacon, 1 cup diced potatoes, sausages, eggs, 1 teaspoon chopped parsley, salt and pepper to taste. Place in a pie-dish and cover with puff pastry and bake in a hot oven for ten minutes, then lower heat and bake for half an hour.

Vienna Steaks.

Mix together 1 lb. lean minced steak, 2 cups soaked bread, 2 teaspoons chopped parsley, 2 tablespoons grated onion, 1 tablespoon tomato sauce, 1 teaspoon Worcestershire sauce, pepper and salt to taste, and, if liked, a little savoury herbs. Bind with one beaten egg and form mixture into round cakes, flatten out a little, sprinkle with flour, and fry in a little butter or good dripping. When they have all been fried, place in a baking dish or casserole dish, cover with a little sauce made by cooking 1 finely-chopped onion in the fat in which the steak was cooked; add 1 dessertspoon flour, cook a little, then add 2 cups stock or water and salt and pepper to taste. Cook for about twenty-five minutes in a moderate oven.

Seaman's Pudding.

Take ½ lb. chuck steak, 1 large onion, ½ lb. flour, 2 oz. chopped suet, 1 teaspoonful baking powder, salt, pepper, a few outside stalks of celery.

Cut the steak into small pieces. Place them in a casserole (or pan) and cover with water. Add seasoning to taste, sliced onion, a little chopped parsley and chopped celery. Place the casserole in the oven and bring to the boil, skim well, and simmer for one hour (gently). Make some suet pastry with the flour, suet, baking powder, a little salt, and a little water. Roll out, and place in the casserole on top of the cooked meat. Put on the lid and simmer gently for about forty minutes.

Pineapple Pie.

Two cupfuls grated pineapple, 1 cupful water, 1 cupful sugar, 2 tablespoonfuls breadcrumbs. Line pie-dish with paste, mix pineapple, water, sugar, breadcrumbs, and yolks of 2 eggs, bake, and when cool beat up the white of eggs and put over pie.

Pineapple Turnovers.

Make a flaky pastry from 2 cups self-raising flour and half-cup dripping. Cut out shapes the size of a tea plate, put a spoonful of chopped pineapple and a little sugar on each fold, press over the edges of the pastry together, and bake in a brisk oven. The turnovers are better served with hot custard.

A. H. TUCKER, Government Printer, Brisbane.